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Marine Fisheries Abstracts

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Marine Fisheries Abstracts

UNITED STATES DEPARTMENT OF COMMERCE

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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Marine Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

0.33 (0.6) USE OF PLASTEIN REACTION IN RECOVERING PROTEIN FROM FISH WASTE

Onoue, Y., and V. M. Riddle (Institute for Food Science and Technology, College of Fisheries, University of Washington, Seattle, WA 98195)
Journal of the Fisheries Research Board of Canada 30, No. 11, 1745-1747 (Nov. 1973)

A high-quality protein-containing product can be recovered in yields of 35% from fish waste by a peptic hydrolysis of the protein followed by a pepsin-catalyzed recombination of soluble peptides to form plastein. The plastein reaction was described by M. Fujimaki, H. Kato, S. Arai, and M. Yamishita [J. Appl. Bacteriol. 34, 119-131 (1971)]. The mechanism of plastein formation is believed to involve coupling of peptide fragments via transpeptidation with release of a terminal amino acid from one fragment. The reaction is probably driven toward synthesis of plastein by the water-insoluble nature of the product as a consequence of the accumulation of nonpolar amino acids.

After several trials, the most efficient process consisted of comminuting fish waste, followed by homogenizing in 0.24N HCl and adjusting the homogenate to pH 2.0. The enzyme pepsin was added in the ratio of enzyme to protein (E:P) of 1:400, and the mixture was incubated at 37° C for 6 h. The mixture was adjusted to pH 4.5 with 2N NaOH and centrifuged at 8,000 g for 10 min. The supernatant was filtered and evaporated to 30% protein solids and readjusted to pH 4.5. The concentrated filtrate was supplemented with additional pepsin in the E:P ratio of 1:200 and incubated for 24 h. At the end of this period the plastein formed and

0.35 (0.36)(9.13) IN VIVO BIOCONVERSION OF β-SITOSTEROL TO CHOLESTEROL IN THE CRAB, PORTUNUS TRITUBERCULATUS

Teshima, Shin-ichi, and Akio Kanazawa (Laboratory of Fisheries Chemistry, Faculty of Fisheries, University of Kagoshima, Japan)
Memoirs of Faculty of Fisheries Kagoshima University 21, No. 1, 91-95 (Dec. 1972)

In earlier work, the authors demonstrated that certain marine crustaceans can convert ergosterol, 24-methylcholesterol, β-sitosterol, and brassicasterol to cholesterol. Mammals, generally, are not able to convert the C_{28}- and C_{29}-sterols to C_{27}-sterols (such as cholesterol). Thus sterol metabolism in marine crustaceans appears to be unique. The purpose of the present study was to obtain further evidence of the bioconversion of exogenous C_{28}- and C_{29}-sterols in crustaceans. The results reported herein indicate that the crab P. trituberculatus is capable of converting β-sitosterol to cholesterol.
[1 figure, 1 table, 12 references] FTP

0.36 (1.951)(1.952) A BIOCHEMICAL BASIS FOR DIFFERENCES IN MAXIMAL DIVING TIME IN AQUATIC MAMMALS

Simon, Lawrence M., Eugene D. Robin, Robert Elsner, Antonius L. G. J. Van Kessel, and James Theodore (Stanford University School of Medicine, Stanford, CA 94305; and Scripps Institution of Oceanography, University of California, La Jolla, CA 92307)
Comparative Biochemistry and Physiology 47, No. 1B, 209-215 (Jan. 15, 1974)

The ability of diving mammals to survive periods of prolonged submersion has been observed and investigated by biologists and physiologists for over 100 years. Because physiological mechanisms do not completely explain the mammals' tolerance to hypoxia during submersion, biochemical adaptations are considered. Other reports by several of the authors indicate that Weddell and harbor seals have a high cerebral tolerance to hypoxemia; further, harbor seal cerebral tissue depends partly on anaerobic energy sources late in a maximum dive, particularly anaerobic glycolysis. Relative rates of glycolysis in various tissues were closely correlated with pyruvate kinase enzyme activities. The authors suggest measurements of pyruvate kinase activity as a an index of glycolytic capacity in diving mammals. In addition, previous work by the authors showed that rates of oxygen utilization in various tissues and species were closely correlated with cytochrome oxidase enzyme activities and could be used as an index of mitochondrial oxygen utilization capacity in diving mammals.

The tissue activities of these two key energy metabolism enzymes were compared in three diving mammals (with widely varying maximal diving times) to elucidate possible biochemical mechanisms which maintain tolerance of prolonged

0.4 THE EFFECT OF TWO JELLYFISH TOXINS ON CALCIUM ION TRANSPORT

Calton, G. J., and J. W. Burnett (Div. of Dermatology, University of Maryland School of Medicine, Baltimore, MD 21201)
Toxicon 11, No. 4, 357-360 (1973)
Aquatic Sciences & Fisheries Abstracts 3, No. 11, 155, Abstract No. 3Q11764M (Nov. 1973)

Toxins prepared from certain species of jellyfish interfered with the ability of skeletal muscle sarcoplasmic reticulum to bind ionic calcium. FTP

0.5 (1.86)(1.0116) AN EPIZOOTIC OF BLUE CRABS, CALLINECTES SAPIDUS, CAUSED BY PARAMOEBA PERNICIOSA

Newman, Martin W., and George E. Ward, Jr. (National Marine Fisheries Service, NOAA, Middle Atlantic Coastal Fisheries Center, Oxford, MD 21654)
Journal of Invertebrate Pathology 22, No. 3, 329-334 (Nov. 1973)

Earlier reports described the gross signs of the "gray crab" disease in 1966, but the identity of the amoeboid cells in the hemolymph of the affected crabs was not known. Reports of other outbreaks of crab deaths in Georgia and South Carolina indicated that the cause probably was not attributable to the amoeboid cells. In this present report, a study was made of the "gray crab" disease in Chincoteague Bay, Va., an enzootic area of the disease.

Crabs were collected weekly in June 1971 during the study period. Hemolymph smears were prepared from each crab and allowed to clot. Smears prepared from heavily infected (gray appearing) crabs would not clot and had to be dried for a longer period than the clotted smears. The smears were stained with Giemsa stain and examined for the presence of amoebae. Gill and hepatopancreas tissues of infected crabs were sectioned and stained to confirm the presence of the amoebae. Attempts to infect crabs either by feeding them infected crab tissues, or by inoculating them with amoebae failed. The authors suggest that either the infection may occur over a long period or some crabs may be able to contain the infection without injury. The authors believe that the probable cause of many of previously reported mass mortalities of blue crab is Paramoeba perniciosa.
[4 figures, 1 table, 7 references] SW

0.4 (4.9) MEMBRANE FATTY ACIDS ASSOCIATED WITH THE ELECTRICAL RESPONSE IN VISUAL EXCITATION

Benolken, R. M. (University of Texas, Graduate School of Biomedical Sciences, Texas Medical Center, Houston, TS 77025), Robert E. Anderson, and Thomas G. Wheeler
Science 182, No. 4118, 1253-1254 (Dec. 21, 1973)

The photoreceptor membranes of vertebrates consist of lipoprotein bilayers containing phospholids and rhodopsin [a purple pigment found in the rods of the retina and required for sensing low intensities of light]. The major fatty acid of the phospholipids from the rods of the rat retina is docosahexaenoic acid [comprised of a 22 carbon chain containing 6 double bonds with the first double bond at the 3 position from the terminal methyl group]. Since rats cannot synthesize this fatty acid, they need precursors from the diet. The fatty acid composition of the phospholipids in the membranes of the photoreceptor outer segments were altered by maintaining a fat-free diet in two generations of rats. The phospholipids of the photoreceptor membranes in the second generation rats contained a reduced amount of docosahexaenoic acid ($22:6_{\omega}3$) and increased amounts of $20:3_{\omega}9$, $22:5_{\omega}6$, and 18:0 fatty acids.

Electroretinograms of rats on the fat-free diet and of controls were used to test the electrical function of the eye. Results of these tests indicate that specific fatty acid alterations are associated with selective modifications of the electrical response of photoreceptor membranes, and docosahexaenoic acid appears to be involved.
[1 figure, 1 table, 9 references] SW

0.33 (0.6)

separated from the solution; the mixture was centrifuged and the plastein residue was washed with aqueous alcohol (50/50) and dried under reduced pressure at room temperature.

The plastein that was obtained was odorless, tasteless, and slightly off-white in color. The composition was determined as 96.1% protein, 2.9% moisture, 0.5% ash, and 0.0% lipid. The plastein product contained a higher proportion of essential amino acids than did a hydrolysate of the whole waste and exceeded FAO reference standards except for tryptophan.
[2 tables, 6 references] SW

0.36 (1.951) (1.952)

dives. The brain, heart, liver, lung, and skeletal muscle tissues of freshly killed California sea lion, harbor seal, and Weddell seal (maximal diving time 8, 20, and 50 min, respectively) were prepared for enzyme assays. Pyruvate kinase and cytochrome oxidase activities were measured spectrophotometrically. The results indicate that the heart and brain tissue of the longest diver (Weddell seal) has greater pyruvate kinase activity than the intermediate diver (harbor seal), and the shortest diver (sea lion) has the least. In skeletal muscle, the Weddell and harbor seal tissue activities were similar, but the enzyme activity was lowest in the sea lion muscle. Lung and liver pyruvate kinase activities were not statistically significant. Cytochrome oxidase activities were greater in the heart tissues of the sea lion than in either of the two seals. The Weddell seal skeletal muscle had lower activity than that of the sea lion or the harbor seal. The harbor seal liver cytochrome oxidase activity was intermediate relative to the other two animals, while lung tissue activities were similar for all three.

The authors suggest that the differences in diving time of the three mammals depend upon enhanced glycolytic capacity in the longest diver rather than mitochondrial oxygen utilization.
[2 figures, 2 tables, 13 references] SW

0.5 (2.05)(6.15) INABILITY TO DETECT SPORES OF CLOSTRIDIUM BOTULINUM IN FISH PROTEIN CONCENTRATE (FPC)

Hauschild, A. H. W., H. Pivnick (Food Research Laboratory, Health Protection Branch, Health And Welfare, Canada, Ottawa, Ontario, Canada), and L. W. Regier
Journal of the Fisheries Research Board of Canada 30, No. 11, 1760-1762 (Nov. 1973)

Large-scale production of FPC for human consumption has caused concern about the level of contamination with C. botulinum spores, particularly type E, the most frequent isolate from fish. To determine the possible presence of these spores in FPC, 124 production lots were prepared in three pilot plants by three different methods and tested for viable spores. Thirty-eight lots, group A, were prepared from skate, dogfish, cod frames and fillets, flounder, ocean perch, sand lance, swordfish, herring, capelin, and haddock frames by the hot isopropanol extraction method described by H. E. Power [J. Fish. Res. Board Can. 19, 1039-1045 (1962)]. Sixty-two lots, group B, were prepared from cod fillets by a mild method (patent pending). Twenty-four lots, group C, were prepared from hake, menhaden, and anchovy by another hot isopropanol extraction method. The samples of FPC were inoculated into tubes of cooked meat medium heated at 80° C for 10 min for spore activation and destruction of vegetative flora. A duplicate set of inoculated tubes was heated at 60° C for 20 min to detect type E spores. The tubes were incubated at 30° C for 4 days and then at 22°-24° C for 3 days. The fluid contents of the tubes in each group with signs of growth were pooled and centrifuged. The supernatant fluids were injected intraperitoneally into white mice. For type E toxin, the supernatant fluids were subjected to trypsin activation and injected similarly.

0.5 A COMPARATIVE STUDY OF THE BACTERICIDAL ACTIVITY OF HORSESHOE CRAB (LIMULUS POLYPHEMUS) HEMOLYMPH AND VERTEBRATE SERUM

Johannsen, R., R. S. Anderson (Sloan-Kettering Institute for Cancer Research, New York, NY 10021), R. A. Good, and N. K. Day
Journal of Invertebrate Pathology 22, No. 3, 372-376 (Nov. 1973)

Cell-free hemolymph preparations obtained from the horseshoe crab were bactericidal for the gram-negative bacteria Escherichia coli and Klebsiella pneumoniae. The hemolymph did not kill Shigella dysenteriae and Pseudomonas aeruginosa. Maximal bactericidal activity of horseshoe crab hemolymph and frog serum occurred at 30° C, while maximum killing by human serum occurs at 37° C. Human and frog serum were most bactericidal at pH 7.5; however, horseshoe crab hemolymph maximum activity occurred at pH 6.0. Complement and antibody are required for antibacterial activity in vertebrate sera. In the presence of complement inhibitors such as heat, immune complexes, endotoxin, cobra venom factor, hydrazine, salicylaldoxime, or zymosan vertebrate sera were inhibited from antibacterial activity against E. coli. In the case of horseshoe crab serum, only heat and endotoxin treatment reduced its activity against E. coli. The physiological significance of these findings is not clear.
[2 figures, 2 tables, 14 references] SW

0.5 OXIDATION-REDUCTION POTENTIAL AND GROWTH OF SALMONELLA AND PSEUDOMONAS FLUORESCENS

Oblinger, J. L., and A. A. Kraft (Dept. of Food Technology, Iowa State University, Ames, IA 50010)
Journal of Food Science 38, No. 7, 1108-1112 (Nov.-Dec. 1973)

The affect of oxidation-reduction potential on bacterial growth has received little attention, probably because of the difficulties in measuring this parameter. Nevertheless, earlier work [W. Burrows, J. Inf. Dis. 69, 141 (1941)] has shown that an association exists between oxidation-reduction potential (Eh) and bacterial growth. The lowest electrode potential is usually reached during the log phase growth of the organisms [L. F. Hewitt, "Oxidation-Reduction Potentials in Bacteriology and Biochemistry," 6th ed., E. & S. Livingstone Ltd., London, England (1950)]. In 1970, L. B. Tabatabai and H. W. Walker [Appl. Microbiol. 20, 441 (1970)] described an apparatus and method for measuring changes in Eh, pH, and bacterial cell numbers. The present authors used that method, with slight modifications, for the measurement of Eh, pH, and bacterial numbers in pure and mixed cultures of Salmonella (typhimurium, heidelberg, infantis, tennessee, enteritidis, and thompson) and Pseudomonas fluorescens (strains F21, F17, and 2). The cultures were incubated at 15°, 30°, and 37° C in trypticase soy broth.

At the initial Eh value of +485 mv (pH 7.0), the Salmonella strains showed high-reducing capacity at 30° and 37° C; at 15° C the lag phase was extended before reducing conditions occurred. P. fluorescens showed gradual reducing activity at 15° and 30° C. Generally, greater growth occurred at 15° C than at 30° or

0.5 (8.8) REPAIR AND ENUMERATION OF INJURED COLIFORMS IN FROZEN FOODS

Warseck, M., B. Ray, and M. L. Speck (Dept. of Food Science, North Carolina State University, Raleigh, NC 27607)
Applied Microbiology 26, No. 6, 919-924 (Dec. 1973)

Earlier work has shown that coliforms in frozen samples may remain undetected by procedures used for their enumeration. The chemicals used in the selective media inhibit the repair and subsequent growth of the freeze-injured cells. When the injured cells have repaired, they regain their resistance to the chemicals. If we are to accomplish the enumeration of coliforms on selective media, then repair of cell damage is essential. The present study involved the subsequent recovery of two strains of Escherichia coli after being frozen in water or sterile foods at -20° C. The sterile foods used were nonfat dry milk, veal infusion, crab meat, and liquid whole eggs. The injured survivors of the E. coli strains were inhibited from forming colonies on violet-red bile agar or deoxycholate lactose agar, and this inhibition was greater for the pour plate method than for the surface or surface-overlay method. Injured cells recovered rapidly in Trypticase soy broth (TSB), with maximum repair taking place after about 1 h at 25° C. Repair of cells also occurred when the injured cells were added to the various foods and incubated at 25° C.; however, the recovery was better when the samples were mixed with TSB and incubated 1 h at 25° C. Multiplication of cells was not evident until after 90 to 120 min incubation of the samples at 25° C. Enumeration of coliform organisms was improved when the thawed samples were mixed with TSB and the injured cells were allowed to repair for 1 h at 25° C. In some samples at

0.5 EFFECT OF pH, SODIUM CHLORIDE, AND SODIUM NITRITE ON ENTEROTOXIN A PRODUCTION

Tompkin, R. B., J. M. Ambrosino, and S. K. Stozek (Swift & Company, Research and Development Center, Oak Brook, IL 60521)
Applied Microbiology 26, No. 6, 833-837 (Dec. 1973)

The combined effects of pH, sodium chloride, and sodium nitrite on enterotoxin A production by Staphylococcus aureus strain 100 were determined using a dialysis sac technique in brain heart infusion (BHI) broth. The dialysis sac technique used was previously described by E. P. Casman, and R. W. Bennett [American Journal of Bacteriology 86, 18-23 (1963)]; it concentrates the enterotoxin and permits detection of weakly enterotoxigenic strains.

Production of toxin decreased as the NaCl levels increased in the BHI broth at pH 7.0. Toxin production decreased as the pH decreased from 7.0 to 4.5. At pH 7.0, nitrite had only a slight effect on toxin production. At 0% and 3% NaCl in the BHI broth, the effect of nitrite was more evident as the pH decreased.

Growth of S. aureus occurred at pH 7.0 with 12% NaCl regardless of the nitrite level (nitrite levels used were 75 and 300 µg/ml). Growth of the organism occurred at pH 4.9 and 4.5 at 0% and 3% NaCl only in the absence of nitrite.

Thus, the addition of $NaNO_2$ influences the growth of S. aureus and decreases the quantity of enterotoxin A produced in BHI broth as the pH is reduced below 7.0. These results are significant in relation to cured meats. Fermented cured meats have been implicated in cases of staphylococcal food poisoning. The present results suggest that the possible benefit of nitrite in fermented sausage should not be ignored as a contributing factor for inhibiting enterotoxin formation.
[3 tables, 16 references]

FTP

0.5 (8.8)

least a 20-fold increase in coliform count was obtained by allowing the injured cells to repair. The recovery of injured cells was not affected by the growth of associated flora. The plating method gave more reproducible recovery of coliforms than did the most probable number method. Furthermore, higher coliform numbers were obtained by the surface-overlay method of plating using violet red bile agar.
[4 figures, 4 tables, 11 references]

FTP

0.6 FOOD MOISTENING AGENTS (3.235)

Wakanabe, Koki, and Masaru Fukushima (Asahi Glass Co., Ltd.) (pat.)
Japan Kokai 73 26,941
Chemical Abstracts 79, No. 21, 124914b (Nov. 26, 1973)

0.5 (2.05)(6.15)

Of the 124 FPC samples, 112 showed growth. Of the 12 that did not show growth after either 60° or 80° C treatment, 8 were from group A, 1 was from group B, and 3 were from group C. No mouse deaths were caused by any of the group A fluids. There were several deaths of mice injected with group B and C fluids, but the deaths were not caused by C. botulinum. No spores of the organism could be demonstrated in any samples. The authors suggest that incubation of larger FPC samples in larger volumes of medium would have led to detection of spores. Contamination with nonbotulinal spores was larger in FPC prepared by the mild, group B method than in the hot isopropanol method of group A.
[1 table, 8 references]

SW

0.5

37° C. The attainment of the maximum number of cells coincided with minimum Eh and pH values (this indicates intense metabolic activity).

Fewer cells per milliliter were produced by both the Salmonella and Pseudomonas strains in mixed culture than were produced by these organisms in pure culture. Possibly, the pseudomonads may have stimulated the salmonellae initially, but an inhibitory effect may have occurred near the end of the test period. Eh values for the mixed cultures showed a blending of the trends of both cultures. However, the pH values in the mixed cultures showed the preponderant influence of the Pseudomonas organisms.

The authors suggest that these studies and future studies of this nature may have application to the associative growth of these types of organisms on meat and poultry products.
[6 figures, 2 tables, 13 references]

FTP

0.6 (2.3) SURIMI--A SEMI-PROCESSED WET FISH PROTEIN

Miyauchi, David, George Kudo, and Max Patashnik (Pacific Fishery Products Technology Center, National Marine Fisheries Service, NOAA, 2725 Montlake Blvd. East, Seattle, WA 98112)
Marine Fisheries Review 35, No. 12, 7-9 (Dec. 1973)

The muscle proteins of many species of fish lose their usefulness in the production of Kamaboko type fish products. Kamaboko is an elastic (or rubberylike) heat-pasteurized fish cake. When certain species of fish are frozen, they lose their ability to provide the desirable elasticity characteristic of Kamaboko products. Thus, in general, high-quality chilled fish had to be used to prepare Kamaboko. Production of Kamaboko, then, was limited by the availability of chilled (not frozen) fish meat. This paper describes the production of surimi, a frozen ground fish product that can be used for the production of Kamaboko.

In preparing surimi, the initial processing steps are similar to those used in preparing Kamaboko. The fish is headed, gutted, and washed. The fish muscle is separated from the bones and skin by a mechanical separator. The minced fish thus produced is washed and then passed through a screw press to remove water. The minced, dewatered fish is passed through a flesh strainer which removes small bones, connective tissue, dark skin particles, scales, and tendons. Additives, such as sugars and tripolyphosphate, are mixed with the strained flesh. The mixture is packaged in 10-kg units in polyethylene bags or in food cartons, and the packaged surimi is frozen in a plate freezer. Surimi is stored at 0° C or lower,

0.6 (2.3) "KAMABOKO"--THE GIANT AMONG JAPANESE PROCESSED FISHERY PRODUCTS

Okada, Minoru (Tokai Regional Fisheries Research Laboratory, Ministry of Agriculture and Forestry, 5, Kachidoki, Chuo-ku, Tokyo, Japan), David Miyauchi, and George Kudo (Pacific Fishery Products Technology Center, National Marine Fisheries Service, NOAA, 2725 Montlake Blvd. East, Seattle, WA 98112)
Marine Fisheries Review 35, No. 12, 1-6 (Dec. 1973)

About 25% of the Japanese catch of fish is processed into Kamaboko products and fish sausages. Over 1 million metric tons were produced in 1970. Three main types of Kamaboko products are prepared. Kamaboko is a fine-textured, elastic, white fish cake that is mounted on a small board and cooked by steaming and/or broiling. Chikuwa is a tubular-shaped fish cake that is cooked by broiling. Satsumaage is various shaped (ball, square, disk, or cylinder) fish cake that is deep-fat fried. Various species of fish may be used to prepare Kamaboko-style products. These include cod, hake, pollock, marlin, croaker, and others. However, the quality of the Kamaboko products may vary with the species of fish used, the freshness of the fish, the sexual maturity of the fish, whether or not the fish were frozen, etc., and on the processing techniques used. To make Kamaboko-style products, the muscle is mechanically separated from the bones and skin of the fish, and mixed with other ingredients. The mixture (paste) is formed into the desired shape and heat-pasteurized. Ground fish constitutes the main ingredient, but starch is sometimes added as a thickening agent and to improve the elasticity, and sugar, salt, flesh extractives, "mirim" (a specially flavored rice wine) are added for

0.6 (2.3) GEL-FORMING CAPACITY OF WASHED AND UNWASHED FLESH OF SOME PACIFIC COAST SPECIES OF FISH

Kudo, George (Pacific Fishery Products Technology Center, National Marine Fisheries Service, NOAA, 2725 Montlake Blvd. East, Seattle, WA 98112), Minoru Okada (Tokai Regional Fisheries Research Laboratory, Fishery Agency, Ministry of Agriculture and Forestry, 5, Tokyo, Japan), and David Miyauchi
Marine Fisheries Review 35, No. 12, 10-15 (Dec. 1973)

The gel-forming capacity of wet fish muscle protein determines its suitability as raw material for Kamaboko and fish sausages. In this study, several species of Pacific Ocean fish were tested for the gel-forming capacity of their muscle proteins when processed into Kamaboko. The gel-forming capacity was evaluated in terms of the elasticity, firmness, and cohesiveness of the finished Kamaboko. The test was made by folding-in-half a slice of Kamaboko 3 mm thick by 3 cm in diameter. If the Kamaboko did not crack on this first fold, the slice was folded again perpendicular to the first fold. The folding test score was based on a 5-point rating as defined by K. Nishiya [In Special Report of Symposium on Cold Storage of Fish Meat, pp. 211-222, Jap. Soc. Sci. Fish. (1963) (In Japanese)]. To prepare the samples, the dressed fish were passed through a mechanical meat separator. Half of the lot of minced flesh was washed with water; both the unwashed and washed minced flesh were used in the test.

Washing the minced fish flesh improved the gel-forming properties of the protein. The various species of fish could be divided into three general groups on the basis of their gel-forming capacity of the washed minced flesh:

0.7 STUDIES ON PROTEIN REQUIREMENTS OF YOUNG MEN FED EGG PROTEIN AND RICE PROTEIN WITH EXCESS AND MAINTENANCE ENERGY INTAKES

Inoue, Goro, Yoshiaki Fujita, and Yoshiaki Niiyama (Dept. of Nutrition, School of Medicine, Tokushima University Tokushima 770, Japan)
Journal of Nutrition 103, No. 12, 1673-1687 (Dec. 1973)

The present work was to evaluate the effect of an excess energy intake of more than 55 kcal/kg on adaptation of young men to a low protein diet containing rice or whole egg protein. The requirements with or without an excess energy intake were also compared. The net protein utilizations and the biological values of rice and whole egg proteins were estimated from the present results.

Following a period of eating a standard diet, young men were given diets containing low levels of egg or rice protein varying stepwise from 0.28 to 0.76 g/kg for 3 weeks. To determine the effect of excess energy intake with a low protein diet, the subjects were divided into two groups: one group received the same level of energy as with the standard diet (ca. 45±2 kcal/kg), while the other was given a daily surplus of about 700 to 1,000 kcal (ca. 57±2 kcal/kg). Protein requirements were estimated by regression analysis of balances at different levels of intake. Results showed that: (1) Administration of excess energy spared loss of labile protein and reduced the time required for adaptation to a low protein diet, with establishment of a nitrogen balance at a lower level than with a maintenance energy diet. (2) Supply of excess energy resulted in increased availability of ingested protein, with a reduction of the protein requirement: with maintenance energy the practical requirements were estimated as 0.65 g/kg with 44

0.6 (2.3)

Good to excellent grade.--The muscle protein of lingcod, Pacific cod, and Pacific ocean perch produced this quality of Kamaboko (as judged by the folding test) even after the fish were stored for 8-10 days in ice. Fresh rockfish (black, bocaccio, canary, and flag) also produced this grade of Kamaboko.

Standard to good grade.--Silvergray rockfish, starry flounder, and hake produced this quality of Kamaboko even from the fish iced up to 7 days.

Substandard to poor grade.--Dogfish muscle protein produced this quality of Kamaboko.

[10 tables, 5 references] Abstracted in part; extracted in part

0.7

NPU for egg protein and 0.87 g/kg with 33 NPU for rice protein, whereas with excess energy the minimum requirements were 0.46 g/kg with 63 NPU and 0.58 g/kg with 50 NPU, respectively. The possibility that the biological value of dietary protein may be variable rather than constant was discussed.

[5 figures, 6 tables, 35 references] Authors' introduction in part and abstract

0.6 (2.3)

the lower the better. The storage life of surimi prepared from Alaska pollock is about 2 months at -10° C and about 1 year at -20° C.

Four grades of surimi are described. The grade depends upon the freshness of the fish used and upon the ability of the product to pass a Kamaboko preparation folding test.

[1 table, 4 references] FTP

0.6 (2.3)

flavoring. Monosodium glutamate is also used. Egg white may be added to improve the glossiness of the product. The processing method is described, and factors affecting quality of the product are discussed.

[2 figures, 6 illustrations, 15 references] FTP

0.6 FOOD USE OF SOYBEAN 7S AND 11S PROTEINS.
(6.54) EXTRACTION AND FUNCTIONAL PROPERTIES OF THEIR FRACTIONS

Sato, Kyoko, and Tokuji Watanabe (National Food Research Institute, Ministry of Agriculture & Forestry, Shiohama, Koto-ku, Tokyo, Japan), and Matsumi Kaji Journal of Food Science 38, No. 7, 1139-1144 (Nov.-Dec. 1973)

The authors propose a practical method to fractionate the 7S and 11S protein rich fractions from defatted soybean meal using a direct extraction with a dilute calcium chloride solution. The protein fractions were used in the preparation of calcium gels, heat-induced gel, cheeselike food, kamabokolike food (fish paste product), and a sausagelike food. The functional properties of the two proteins were quite different and neither were successfully applied to the fish or meat product. The authors suggest, however, that it would be worthwhile to test further both proteins for such possible food use.

[8 figures, 5 tables, 12 references] FTP

1.0145 (2.117)(2.118) SOVIET FISHERIES: A REVIEW

Sealy, T. S.
Underwater Journal and Information Bulletin 5, No. 4, 152-174 (Aug. 1973)

Before the Second World War, the Soviet fishing fleet produced a total catch of 1.4 million tons in 1940. At the end of the war, more than 5,000 fishing vessels, almost the total number of the Soviet western fishing fleet had been lost. In addition, harbors and other shore facilities in the Azov, Black, and Baltic Seas and other northern sea areas had either been destroyed or heavily damaged. In the years following the war to 1966, the Soviet Union rebuilt and expanded its fishing industry; by 1967, it had become the world's third largest catcher of fish (after Peru and Japan) with a catch of 5.8 million tons. Further, it had the world's largest fleet of fishing and associated vessels. This development of the industry was brought about by the accomplishment of a series of 5-year plans in which about $4 billion was invested in rebuilding shore facilities and purchase of fishing vessels mainly from Poland and East Germany. The expansion of the fisheries was needed to meet the continuing shortage of protein and other agricultural products.

In this review, the organization, the operation, and the facilities of the Soviet fishing industry are described. The administration of the industry, from the top central authority of the Government through the territorial authorities, and down to the local collective fishing units, is covered. Research and development effort is described. VNIRO, the All-Union Scientific Research Institute for Fisheries and Oceanography is one of the important agencies directing the

1.951 (8.53)(4.1) FATTY ACID COMPOSITION OF THE HARP SEAL, PAGOPHILUS GROENLANDICUS (PHOCA GROENLANDICA)

Engelhardt, F. R., and B. L. Walker
Comparative Biochemistry and Physiology 47, No. 1B, 169-179 (Jan. 15, 1974)

The harp seal is a commercially important species occurring in the Gulf of St. Lawrence and off the coasts of Newfoundland and Labrador; the annual catches have been almost 300,000 animals in some years. Oil, leather, and fur of this seal are marketed, in addition to its flippers. It is also used as a research animal. For these reasons, adding to the knowledge of the biology of the harp seal is necessary. Experiments were performed to determine the fatty acid composition of harp seal tissue.

Samples of tissue were taken from females and pups of a breeding colony in the Gulf of St. Lawrence; blubber, liver, skeletal muscle, heart muscle, aorta, brain, and pup testis tissues were selected. The lipids were extracted and converted to methyl esters which were purified by thin-layer chromatography. The methyl esters of the fatty acids were identified by gas-liquid chromatography.

The results indicate that saturated fatty acids comprised 12% of the blubber of the adults. Thirty-four percent of the liver fats consisted of saturated fatty acids; 25% of skeletal muscle, heart muscle, and aorta fats consisted of saturated fatty acids. Thirty-eight percent of brain fat consisted of saturated fatty acids. The saturated fatty acid concentration in pup testis was 31%. The pattern of saturated fatty acids in pup tissues was the same as that in the adults.

1.86 (1.0112) ALASKA'S FISHERY RESOURCES -- THE DUNGENESS CRAB

Hoopes, David T. (National Marine Fisheries Service, Auke Bay Fisheries Laboratory, Auke Bay, AK 99821)
Fishery Facts-6, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98105 (Nov. 1973), 14 pp. (For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402)

Dungeness crabs, Cancer magister, occur in the inshore waters of the west coast of the United States and Alaska. Alaska production has averaged 9.2 million pounds annually since 1960; the yearly average value to the fishermen was between $1 and $2 million. A female may lay up to 1.5 million eggs, which adhere to small appendages under her abdomen until they hatch 7 to 10 mo later. After hatching, the minute larvae spend 3 to 4 mo in the water column as plankton. At the end of their planktonic development period, the larvae settle to the bottom and transform into juvenile crabs. Dungeness crabs grow only during the molting period. Males may live for 8 yr and attain 10 inches in width; females are considerably smaller. The commercial fishery takes only male crabs, which are caught in baited pots. Crabs are either delivered to market alive or are cooked and prepared in several ways. In Alaska the State Department of Fish and Game is responsible for conducting research required for rational management and protection of this valuable shellfish resource.
[6 figures, 6 references] Author's abstract

2.00 REACTION OF HYDROGEN PEROXIDE WITH MYOGLOBINS

Morey, K. S., Stephen P. Hansen, and W. Duane Brown (Institute of Marine Resources and Dept. of Food Science & Technology, University of California, Davis, CA 95616)
Journal of Food Science 38, No. 7, 1104-1107 (Nov.-Dec. 1973)

The development of green-brown-tan pigments sometimes found in cooked tuna is collectively termed "greening." The discoloration may be formed by reactions involving various chemicals, including trimethylamine oxide (TMAO) or hydrogen peroxide. In the present study, the researchers examined the changes in color and spectra that occur during the interaction of H_2O_2 with tuna or sperm whale myoglobins in their native and denatured states. Also, they examined the effects of cysteine and homocysteine on the intensity of the green discoloration produced by H_2O_2 so as to compare this type of greening with that produced by TMAO. Tests were carried out to determine the effect of dithionite (a reducing agent) on the green color and on the spectra of the myoglobins. The interaction of H_2O_2 with the myoglobins was examined under the following conditions: (1) with native (undenatured) myoglobins, with and without dithionite; (2) with denatured (using sodium dodecyl sulfate [SDS]), with and without dithionite; (3) with denatured myoglobins plus cysteine, with and without dithionite; (4) with denatured myoglobins plus homocysteine, with and without dithionite; (5) same as tests (2) and (4) except that the myoglobin was first reacted with H_2O_2, and then the protein was denatured and the other reagents were added.

1.89 NORTHWEST ATLANTIC SQUIDS
(1.0115)
(2.147)

Rathjen, Warren F. (Northeast Regional Office, National Marine Fisheries Service, NOAA, 14 Elm St., Gloucester, MA 01930)
Marine Fisheries Review 35, No. 12, 20-26 (Dec. 1973)

Although the annual world catch of squid increased eightfold during the period between 1938 and 1968, the author believes that the resource potential is enormous. This paper discusses the various commercial species of squid in the Northwest Atlantic, their availability, and the gear and fishing methods used in their capture.
[9 figures, 26 references] FTP

The distribution of Meganyctiphanes norvegica and Euphausia superba is described and information is given on their use as food in fish farms for trout, salmon, bass, and prawns. FTP

1.89 [THE 'KRILL' IN THE BAY OF BISCAY]
(1.0148) LE 'KRILL' DU GOLFE DE GASCOGNE

Le Gall, J. Y.
Pêche Marit. Paris, No. 1142, 316-321 (1973) (Cent. Océanol. Bretagne, Brest, France) [In French]
Aquatic Sciences & Fisheries Abstracts 3, No. 11, 158, Abstract No. 3Q1178ZM (Nov. 1973)

The distribution of Meganyctiphanes norvegica and Euphausia superba is described and information is given on their use as food in fish farms for trout, salmon, bass, and prawns. FTP

2.00

The myoglobins from the sperm whale and yellowfin tuna reacted with H_2O_2 to form red-brown pigments and showed somewhat different spectra. The whale pigment, following reduction with dithionite, turned green; the tuna myoglobin pigment, on reduction with dithionite, turned golden-brown. When the myoglobins from the sperm whale and the tuna were reacted with H_2O_2 and then denatured with sodium dodecyl sulfate, green pigments were produced. Cysteine or homocysteine had no effect on this reaction. This green pigment is different from that previously obtained from the reaction of denatured tuna myoglobin, cysteine, and trimethylamine oxide.
[6 figures, 15 references] FTP

1.0145 (2.117)(2.118)

research program. Through education and training programs, the Soviet Union has transformed the fishing industry into a nationally recognized profession with a planned career structure. The fishing operations are defined with flow diagrams showing the organization of a fishing flotilla. The flotilla is commanded from a mother ship by officers who direct catcher boats, supply ships, fish carriers, and port activities. The statistics of fishing vessels, classified into trawlers and other fishing vessels, fish carriers, and factory ships are provided. The principal particulars of factory ships, various types of trawlers, and fish carriers, built between 1957 and 1972, are also given. Soviet fish catches at various ocean locations are tabulated for the years 1967-71. A statistic from this table shows the catch in the northwest Atlantic and Arctic Oceans was 624.3 thousand metric tons in 1967; in 1971, the catch from this area rose to 1021.5 thousand tons. The review also includes a description of the foreign relations engaged in by the Soviet fishing industry particularly with developing nations and other coastal states. The objectives of future development of the industry are to increase the catch and to find uses for lesser known species.
[19 figures, 22 tables, 7 references] SW

1.951 (8.53)(4.1)

About two-thirds of the unsaturated fatty acid concentrations in adult blubber, skeletal muscle, and aorta consisted of monoenoic fatty acids. In heart muscle, monoenes comprise slightly over 50% of the total unsaturated fatty acids. Monoenes were relatively low in the liver and brain tissues of the adults, and the testis of the pups. Dienoic fatty acids (also unsaturated) contributed less than 3% to the total fatty acid content of adult harp seal blubber; the diene concentration is slightly higher in liver, skeletal muscle, heart muscle, and aorta. Concentrations of dienes in the brain were the lowest of any tissue studied. Values for pup testis correspond to those for blubber in the adult, and the heart muscle of the pup was the only tissue that was different from the adult in that the diene concentration was lower. Polyenes (also unsaturated) constituted about one-fourth of the adult blubber fat, and liver concentrations were similar. Skeletal muscle and aorta polyene concentrations were relatively low. Heart muscle concentrations of polyenes were higher than skeletal muscle and aorta. Pup polyenoic fatty acids in the fat from various tissues were different from those in the adults.
The fatty acids in the organ tissues are shown in tables.
[2 tables, 9 references] SW

2.116 THE QUANTITATIVE USE OF ECHO SOUNDERS--INTRODUCTORY NOTES

Craig, R. E. (UNDP/FAO Fisheries Research and Development Project, Apartado 3734, Lima Peru)
FAO Fisheries Circular No. 319, Food and Agriculture Organization of the United Nations, Rome, Italy (Oct. 1973), 15 pp. (Distribution restricted)

This circular was issued to meet the needs of FAO training activities and supplements the "Manual of Methods for Fisheries Resources Survey and Appraisal. Part 2. The Use of Acoustic Instruments for Fish Detection and Abundance Estimation." This present circular gives more detailed instruction in the theory and use of echo integration. Since this technological field is expanding, this circular will be updated as required. The subjects covered in the circular include: theory of echo sounders, the method of integration, characteristics of the equipment used, calibration of the equipment, and typical parameters.
[3 references]

SW

2.12 (9.7)(9.2) MANUAL OF METHODS FOR FISHERIES RESOURCE SURVEY AND APPRAISAL. PART 3 - STANDARD METHODS AND TECHNIQUES FOR DEMERSAL FISHERIES RESOURCE SURVEYS

Mackett, David J. (National Marine Fisheries Service, NOAA, Southwest Fisheries Center, La Jolla, CA 92037)
FAO Fisheries Technical Paper No. 124, Food and Agriculture Organization of the United Nations, Rome, Italy (1973), 39 pp. (Distribution restricted)

The aim of most FAO resource surveys is to provide facts and information to potential investors who are interested in developing a new fishery or extending an existing one. This manual is an introduction to the elements of systems analysis of the conduct and strategy of FAO demersal resource surveys, and it illustrates the steps of stratified random sampling as a tool in assessing demersal stocks of fish. A few suggested methods for measuring and recording catches and lengths of fish are also given. In addition, a standard form and instructions for recording the results of the survey and for estimating yields are included. The main sections of the manual include: "Survey Objectives and Strategy"; "Scope of Resource Surveys"; "The Sampling Scheme of the Survey"; "Organization of Field Work"; and "Methods of Measurement."
[17 references]

SW

2.1477 STUDIES ON THE SEVERAL RAW FISH BAITS IN TUNA-LONG-LINE FISHING--I. SOME RESULTS OF COMPARATIVE FISH BAIT EXPERIMENTS USING FOR BAITS FROZEN SAURY, ROUND SCAD, MACKEREL AND SQUID FOR HOOKING TUNA, MARLIN AND SWORD FISH

Imai, Takehiko (Faculty of Fisheries, Kagoshima University)
Memoirs of Faculty of Fisheries Kagoshima University 21, No. 1, 45-50 (Dec. 1972)
[In Japanese; figure, tables, and abstract in English]

These longline fishing tests were carried out in the western part of the South Pacific Ocean in 1970 aboard a fishing training vessel. Two hundred baskets of longline gear were used. The following baits were tested: saury, round scad, mackerel, and squid. The hooking rates for each bait are shown in the table that follows.

Bait used (longlining)	Hooking rates: For tuna	For marlin and swordfish	For all species [1] (av)
	%	%	%
Saury	2.96	0.35	3.30
Round scad	2.51	0.84	3.35
Mackerel	0.97	0.30	1.27
Squid	1.19	0.07	1.26

[1] Includes two species of tuna, marlin, and swordfish.

[2 figures, 4 tables, 13 references]

FTP

2.1477 ON THE BAIT FOR TUNA LONG LINE--III. N. T. FISHING LIGHT TYPE L. L. OF ACRYL RESIN

Shimada, Kiyoshi (Faculty of Fisheries, Kagoshima University, Kagoshima, Japan)
Memoirs of Faculty of Fisheries Kagoshima University 21, No. 1, 79-89 (Dec. 1972)
[In Japanese; figures, tables, and abstract in English]

Experimental longline fishing was carried out using an artificial bait fishing light made of acrylic resin and real bait (saury, mackerel, and mackerel scad). The hooking rate with real bait was higher than that using the fishing light. The highest hooking rate for the real bait was achieved by the mackerel scad bait, followed by the mackerel and saury.
[4 figures, 10 tables, 7 references]

FTP

2.1477 LINE FISHING ON THE CONTINENTAL SLOPE.
(2.12) THE SELECTIVE EFFECT OF DIFFERENT HOOK PATTERNS

Forster, G. R. (Plymouth Laboratory, Citadel Hill, Plymouth PL 1 2PB, England)
Journal of the Marine Biological Association of the United Kingdom 53, No. 4, 749-751 (Nov. 1973)

During short cruises of a research vessel to the South Biscay area several fishing hauls were made with a 100 hook longline on the Continental Slope at depths from 800 to 3,600 m. Two different patterns of hooks were used: an incurving hook pattern (based on a traditional South Pacific type of wooden hook) and a normal hook pattern. The purpose of these test hauls was to find out if the incurving hook pattern showed any advantage over the normal hook pattern.

Of a total of 151 fish captured, 62% were caught on the incurving hooks. For certain species of fish (particularly the gadoids) the incurving point hooks were more effective than the normal pattern hooks.

[1 figure, 1 table, 3 references] FTP

2.116 POPULATION AND PARAMETER ESTIMATION IN THE ACOUSTIC
(2.146) ENUMERATION OF A MIGRATING FISH POPULATION

Lord, Gary E. (Fisheries Research Institute, University of Washington, Seattle, WA 98195)
Biometrics 29, No. 4, 713-725 (Dec. 1973)

A method of fish population enumeration is presented; the method is based on parameter estimation from data obtained by an acoustic counting system currently under investigation. The acoustic equipment is to be used initially for counting a population of sockeye salmon on the high seas, although its use is not limited to either the species or the high seas. The primary sensing elements of the system will be upward looking transducers suspended from surface buoys. Each transducer will operate as a transmitter and as a receiver located at the depth that nearly all the fish of interest pass between the transducer and the water surface. This region subjected to sound transmissions will be in the shape of an inverted cone with the transducer at the apex. The system will detect and count the return echoes, above a selected threshold amplitude, from fish in the sampling volume at any given time. The echo counts are transformed statistically into fish density estimates from which relative population values may be inferred. Absolute estimation of the population is possible by a suitable integration over space and time. The estimates will be subject to bias or error from vertical variation of the fish density, the minimum range difference at which two targets may be distinguished, and variations in amplitude of the returning echoes. A series of equations relating to population estimation and parameter estimation is presented with a special case and a numerical example.

[2 figures, 1 table, 7 references] SW

2.1479 THE LONG-HAUL FISHERY OF NORTH CAROLINA

Guthrie, James F., Richard L. Kroger, Herbert R. Cordy, and Curtis W. Lewis (Atlantic Estuarine Fisheries Center, National Marine Fisheries Service, NOAA, Beaufort, NC 28516)
Marine Fisheries Review 35, No. 12, 27-33 (Dec. 1973)

Long-haul fishing has been used to harvest fish in the shallow, inside waters of Albemarle, Pamlico, Core and Bogue Sounds, North Carolina since the early 1900's. In long-hauling, a 1,000- to 1,200-yard 6-foot-deep net is pulled between two boats for up to 5 miles before the fish are encircled and concentrated by pulling the net around a stake. Long-haul fishing is somewhat unique because the cork line remains a few feet (dependent on depth of the water) under the water surface during the haul but the lead line remains on the bottom. Bottom fish and most others leisurely swim ahead of the slow moving net instead of escaping over the sunken cork line and do not try to escape. At the end of the haul they are trapped in a deeper section of net whose cork line floats at the surface. The methods of long-haul fishing should be applicable for harvesting fish in other shallow water areas with unobstructed bottoms. In this paper the authors describe the gear and methods used by fishermen from Harkers Island in Carteret County, and give a brief history of the fishery and catches.

[6 figures, 1 table, 1 reference] Authors' introduction slightly edited

2.1477 STUDIES ON THE SEVERAL RAW FISH BAITS IN TUNA-LONG-LINE FISHING--II. SOME RESULTS OF COMPARATIVE FISH BAIT EXPERIMENTS USING FOR BAITS FROZEN SAURY, ROUND SCAD AND MACKEREL FOR HOOKING TUNA, MARLIN AND SWORD FISH

Imai, Takehiko, and Osamu Shirakawa (Faculty of Fisheries, Kagoshima University, Japan)
Memoirs of Faculty of Fisheries Kagoshima University 21, No. 1, 51-62 (Dec. 1972)
[In Japanese; figures, tables, and abstract in English]

These longline fishing tests were carried out in the Coral Sea in 1971 aboard a fishing training vessel. Three baits were tested.

Bait used (longlining)	Hooking rates			Dropping rate of bait (mean)
	For tuna	For swordfish and marlin	For all species [1] (av)	
	%	%	%	%
Saury	4.76	0.11	4.86	68.9
Round scad	5.38	0.32	5.70	51.7
Mackerel	3.04	0.65	3.68	31.3

[1] Includes two species of tuna, swordfish, and marlin.

[7 figures, 7 tables, 10 references] FTP

2.3 (8.8) TECHNIQUES FOR STUNNING CHANNEL CATFISH AND THEIR EFFECTS ON PRODUCT QUALITY

Boggess, T. S., Jr., E. K. Heaton, A. L. Shewfelt, and D. W. Parvin (Dept. of Food Science, University of Georgia College of Agriculture Experiment Stations, Georgia Station, Experiment, GA 30212)
Journal of Food Science 38, No. 7, 1190-1193 (Nov.-Dec. 1973)

Five methods of immobilizing catfish for subsequent processing were used to determine their effect on the subsequent quality of the frozen, stored fish. The methods used were: (1) CO_2 gas, (2) bleeding, (3) alternating current (a.c.) shock, (4) direct current (d.c.) shock, and (5) icing. The live catfish were immobilized by each of the five methods and then were dressed, frozen, and stored (frozen). Samples of the catfish were examined at appropriate intervals of storage. The catfish samples were tested for color difference using the Gardner Color Difference Meter and for shear press firmness using the Food Technology Corp. Texture Test System Model TP-1. A panel of judges also evaluated the thawed fish for appearance, color, and aroma.

In general, the CO_2 gas and bleeding (a gill and tail cut) treatments produced a better quality product than did the electrically stunning and icing treatments (the former two methods produced more complete bleeding and a whiter product than did the latter two methods). The a.c.-shock treatment produced the poorest product. Lack of complete bleeding seemed to affect the appearance and color of the raw product. The icing treatment produced fish that were harder to skin than those immobilized by the other methods. After 2 months of frozen storage of the catfish, differences in appearance, color, and texture associated with

3.19 EFFECT OF PACKAGING ON SHELF LIFE OF FROZEN SILVER SALMON STEAKS

Yu, T. C., R. O. Sinnhuber, and D. L. Crawford (Dept. of Food Science & Technology, Oregon State University, Corvallis, OR 97331)
Journal of Food Science 38, No. 7, 1197-1199 (Nov.-Dec. 1973)

The purpose of this study was to determine the shelf life of packaged frozen silver salmon steaks. The steaks were cut from eviscerated, cleaned fish that had been frozen overnight at -27° C. For the control sample, each steak was placed in a 1-mil polyethylene bag and twist-closed with a wire. The test steaks were placed in a 4-mil Mylar-polyethylene laminated pouch, and the bags were sealed under 29 in of vacuum. Additional lots of vacuum packaged steaks were prepared with the addition of a solution containing butylated hydroxyanisole (BHA) or butylated hydroxytoluene (BHT) as antioxidants. Some samples were stored at -18° C, and others were exposed to storage temperatures fluctuating between -18° and -4.5° C. The amount of oxidative rancidity that developed in the steaks during storage was estimated by means of the peroxide value. Also, the stored samples were examined periodically for texture, juiciness, flavor, and overall desirability by a panel.

The control samples of packaged silver salmon steaks became unacceptable after 9 months of storage at -18° C. The vacuum-packed samples (without and with added antioxidants) were of good quality after 12 months of storage. Fluctuating storage temperature seemed to cause severe damage to the quality of the packaged, frozen silver salmon steaks.

[3 figures, 13 references] FTP

4.5 EFFECT OF COPPER BINDING ON THE AUTOXIDATION OF OXYMYOGLOBINS

Bembers, M., N. Y. Zachariah, L. D. Satterlee, and R. M. Hill (Depts. of Food Science & Technology and Biochemistry & Nutrition, University of Nebraska, Lincoln, NE 68503)
Journal of Food Science 38, No. 7, 1122-1123 (Nov.-Dec. 1973)

Information on the autoxidation rates of oxymyoglobin is of interest in relation to the stability of the color of meat. We already know from previous work that the partial pressure of oxygen, pH, and temperature affect the autoxidation rate of oxymyoglobin. Furthermore, changes in autoxidation rates are caused by changes in buffer strengths, freezing and thawing cycles, and degree of purification of the oxymyoglobin. H. E. Snyder and H. B. Skrdlant [J. Food Sci. 31, 468 (1966)] found that variable autoxidation rates for purified oxymyoglobin were due to trace metal ion contamination; the addition of copper to oxymyoglobin in equimolar amounts increased the autoxidation rate constant 25-fold. The purpose of the present study was to examine the effects of Cu^{+2} ion on the stability of the oxymyoglobin from bovine, ovine (sheep), and porcine tissue. The various oxymyoglobins were purified and characterized by the latest methods. The autoxidation rates were determined by incubating the oxymyoglobins at 30° C in 10 mM phosphate buffer at pH 6.0. The copper ($CuCl_2$) containing solution was added to the freshly prepared oxymyoglobin just prior to the beginning of the autoxidation test.

Large autoxidation rate constants were obtained after the addition of Cu^{2+} to an oxymyoglobin solution, indicating that copper concentrations of 200 molar

4.61 ACTIVITY OF ANTIOXIDANTS IN FRESH FISH

Sweet, C. W. (Research Laboratories, Tennessee Eastman Co., Div. of Eastman Kodak Co., Kingsport, TN 37662)
Journal of Food Science 38, No. 7, 1260-1261 (Nov.-Dec. 1973)

The purpose of this work was to determine the relative effectiveness of various chemical formulations in stabilizing fresh ground fish muscle against oxidation at low temperatures. The following antioxidants were used: butylated hydroxyanisole, butylated hydroxytoluene, propyl gallate, thiodipropionic acid, α-ô-tocopherol, and tert-butylhydroquinone. The chelating agents tested were citric acid and disodium ethylenediaminetetraacetate (EDTA). Chlortetracycline hydrochloride was used as a bactericide. Rancidity was estimated by means of the 2-thiobarbituric acid test. The ground flesh of silver salmon, haddock, flounder, crappie, and bass were used. Chlortetracycline was added to the ground fish. The test antioxidants and chelating agents were then added to the ground mixture. The samples were appropriately reground to insure thorough mixing of bactericide, antioxidants, and chelating agents. The samples were packed in glass jars, and the jars were covered with low-density polyethylene (oxygen permeable, water impermeable). The samples were stored at 4°-5° C.

The results indicated that the most effective inhibitors of rancidity in the ground fish were combinations of tert-butylhydroquinone, or butylated hydroxyanisole and citric acid or EDTA. The most effective combination for the ground salmon was tert-butylhydroquinone and citric acid.

[2 tables, 11 references] FTP

4.15 (8.53)

STUDY ON THE LIVER OIL OF MARINE CRUSTACEA. II. FATTY ACIDS AND UNSAPONIFIABLE MATTERS IN THE LIVER OILS OF CHIONOECETES OPILIO, LITHODES TURRITUS AND PARALITHODES CAMTSCHATICA

Kawada, Kazuo, Hajime Seino, Shōichirō Watanabe, and Yoshirō Abe (Dept. of Chemistry, Faculty of Hygienic Sciences, Kitasato University)
Journal of the Japan Oil Chemists' Society 20, No. 10, 18-23 (Oct. 1973) (In Japanese; figures and summary in English)

The fatty acids of the liver oils of C. opilio, L. turritus, and P. camtschatica consisted mostly of C_{12}-C_{24} fatty acids, with oleic acid as the major constituent. The precipitate obtained by low temperature fractional crystallization of the unsaponifiable fraction contained ergosterol, cholesterol, and C_8-C_{19} α-alkyl glycerol ethers. The mother liquor [presumably from the fractional crystallization] contained C_{10}-C_{20} saturated hydrocarbons, C_{11}-C_{18} aliphatic alcohols, higher aliphatic aldehydes, and methyl ketones.
[10 figures, 9 references] FTP

4.9 (0.7)

INFLUENCE OF PROTEIN AND VITAMIN LEVELS ON THE NUTRITIONAL VALUE OF HEATED FATS FOR RATS

Hemans, C., F. Kummerow, and E. G. Perkins (Burnsides Research Laboratory, Dept. of Food Science, University of Illinois, Urbana, IL 61801)
Journal of Nutrition 103, No. 12, 1665-1672 (Dec. 1972)

In the present study, corn oil which had been heated so as to contain less polymer material than many commercially used fats was fed to groups of weanling rats; the diets contained various protein and vitamin levels. The weight gain, feed efficiency, and protein efficiency ratios of the animals fed the various diets were compared and the results are reported herein.

The diet consisted of the heated corn oil containing low levels of nonvolatile oxidation products and protein levels of 8, 10, 20 and 30% of the diet. The study was conducted in two sequential phases by varying the vitamin level by a factor of 100. Animals fed the heated oil at the low vitamin level gained significantly less weight than those fed fresh corn oil. Growth depression was most severe at the 8 and 10% levels of protein. When the diets were changed to include a vitamin mix containing 100 times the previous level, there was no significant difference in subsequent weight gains between any paired groups of animals receiving similar diets. The growth response of rats that was observed in the present study suggested an interrelationship between the level of nonvolatile oxidation products present in the heated fat, the vitamin level, and the protein level in the total diet.
[6 tables, 26 references] Authors' introduction in part and abstract

2.3 (8.8)

the treatments were not significant, but the aroma and flavor values were lowered due to the poorly bled fish. Inasmuch as the two treatments (CO_2 gas and bleeding) which gave the best results are not now used commercially, it is apparent that revised methods of processing of catfish should be considered.
[2 figures, 6 tables, 10 references] FTP

4.5

equivalents or greater are needed to significantly affect the autoxidation rates of oxymyoglobin. Porcine oxymyoglobin bound more Cu^{2+} ion than did bovine or ovine oxymyoglobin, and its stability was least affected by the bound copper. The binding of the Cu^{2+} ion altered the isoelectric point of porcine metmyoglobin and oxymyoglobin.
[3 figures, 2 tables, 13 references] FTP

2.3 CRAWFISH PEELER

Ingalls, Edgar J. (Kendalwood Rd., Baton Rouge, LA 70815) (pat.)
U.S. Patent 3,758,921 (Sept. 18, 1973)

This patent is for a machine that automatically peels crawfish or other crustaceans. FTP

4.86 PREPARATION OF FATTLIQUORS

Salam, Muhammad A. (Hilal Tanneries Ltd., Gujrat, Pakistan)
Chemical Abstracts 79, No. 14, 80360m (Oct. 8, 1973)

4.9 DIETARY FAT COMPOSITION AND TOCOPHEROL REQUIREMENT: IV. SAFETY OF POLYUNSATURATED FATS

Alfin-Slater, R. B., P. Wells, L. Aftergood (School of Public Health, University of California, Los Angeles, CA 90024), and D. Melnick
Journal of the American Oil Chemists' Society 50, No. 12, 479-484 (Dec. 1973)

There are several unresolved questions relating to the role of fat in the diet such as: the optimal amount of polyunsaturated fatty acids in the diet; the optimal ratio of polyunsaturated to saturated fatty acids (P:S) in the diet; and whether additional quantities of polyunsaturated fat products in the diet either increases the requirement for antioxidants (the tocopherols) or is detrimental to the organism fed such a diet.

In the laboratories of the authors, a long-term, multigeneration study was conducted for 32 years on rats fed a semisynthetic diet and margarine as the source of fat. During these years the margarine in the diet was modified to reflect changes in product development--principally an increase in the polyunsaturated fat content. The dietary fat was the source of tocopherol (T). Saturated fatty acid content (S) remained stable at about 20% of the fat and the level of tocopherol also remained constant at about 0.12% of the fat. Polyunsaturated (P) fatty acid content progressively rose from 7.5% to 28.5% of the fat in the diet. Alpha-tocopherol levels decreased from 0.033% to 0.016% of the fat content. Thus, the ratio of P to alpha-tocopherol changed from 227:1, at the beginning of the experiment, to 1780:1 currently with S and T content remaining constant in the fat composition during the 32-year period. In addition, fat level in the diet increased from 9.2% at the beginning to 16.0% through the years.

6.190 FISH MEAL IN GRANULATED HIGH-PROTEIN CONCENTRATES FOR CALFS

Wawrzyńczak, S., and S. Kamiński
Biuletyn Informacyjny Instytutu Zootechniki No. 4, 6-20 (1972)
Polish Technical and Economic Abstracts No. 3, 89, Abstract No. 15868 (1973)
(Center for Scientific Technical and Economic Information, Warszawa, Al. Niepodległości 186, Poland)

In feeding tests with heifer calves, the authors found that use of prestarter and starter mixed feeds containing 15% fish meal was better from the standpoint of gain in live weight of the calves, feed conversion, and economy than was mixed feeds containing 10% fish meal and conventional feeding procedures. FTP

6.36 INDUSTRIAL USE OF ALGAE

Mildner, Pavao, and Blanka Ries (Technol. Fak. Zagreb, Yugoslavia)
Chemical Abstracts 79, No. 21, 124748a (Nov. 26, 1973)

6.37 QUALITY EVALUATION OF THE PROTEIN FRACTION OF (1.0149) SOME SEAWEED OF THE HIGH ADRIATIC SEA

Brunt, G., and B. Stancher (Ist. Merceol., Univ. Trieste, Trieste, Italy)
Chemical Abstracts 79, No. 25, 145039k (Dec. 24, 1973)

6.51 (9.16) PRELIMINARY STUDIES ON THE PREPARATION AND FEEDING OF CRUSTACEAN DIETS

Balazs, George H. (Hawaii Institute of Marine Biology, University of Hawaii, Kaneohe, HI 96744), Ernest Ross, and Coy C. Brooks
Aquaculture 2, No. 4, 369-377 (Dec. 1973)

Feedstuffs used in diets for crustacea under aquaculture conditions must be water-stable to minimize disintegration and subsequent loss and fouling of the water. In this study, seven crustacean diets of differing composition were prepared by blending each with 20% high-gluten wheat flour, adding water, and kneading the material into a stiff dough. The dough was then extruded through a die having small holes. The formed material was dried at 8° C and packaged in plastic bags. The diets were tested for their dry weight loss over a 5-h period by immersing them in sea water or fresh water in an aquarium. Feeding studies with marine and freshwater crustacea were carried out with each of the diets to determine their growth-promoting values.

The method of preparing the feeds (described above) is simple, rapid, and relatively inexpensive. The prepared diets had an acceptable level of water stability. In general, dissolution was influenced by diet composition, and dissolution was greater in fresh water than in sea water. The diets prepared by the described method produced good growth in penaeid shrimp and Malaysian prawns reared under controlled laboratory conditions and under mass culture conditions for short periods of time.
[3 tables, 9 references] FTP

6.34 PROPERTIES OF SODIUM ALGINATES AND PROPYLENE GLYCOL ALGINATE ESTER, AND THEIR APPLICATION FOR FOODS

Kasahara, Fumio (Kimitsu Kagaku Kogyo Co., Ltd., Kimitsu, Japan)
Chemical Abstracts 79, No. 15, 90553r (Oct. 15, 1973)

6.54 (1.81) SEASONINGS PREPARED FROM OYSTER HYDROLYZATES

Matsukura, Kenji (pat.)
Japan. Kokai 73 22,661 (Mar. 23, 1973)
Chemical Abstracts 79, No. 21, 124912z (Nov. 26, 1973)

6.34 WATER-SOLUBLE ALGINATES FOR TABLETS AND CAPSULES WITH DEPOT EFFECT

Klavdianos, Stylianos, Joachim Wagner, and Heinz M. Weidemann (EFEKA Friedrich und Kaufmann Arzneimittel Fabrik) (pat.)
German Offen. 2,065,404 (Aug. 16, 1973)
Chemical Abstracts 79, No. 21, 122577v (Nov. 26, 1973)

6.54 (1.85) SEASONINGS PREPARED FROM HYDROLYZATES OF MYSID SHRIMP

Yamase, Masaaki (Tokai Fishery Research Institute) (pat.)
Japan. Kokai 73 22,663 (Mar. 23, 1973)
Chemical Abstracts 79, No. 21, 124911y (Nov. 26, 1973)

4.9

The impact of these changes was evaluated by comparing the biological performance of the successive generations. Growth, reproduction, and lactation was satisfactory and comparable from generation to generation. Longevity studies on selected generations yielded data that showed dietary changes had no deleterious effects. Histological examinations of organ tissue indicated minimal myocarditis and no malignant tumors attributable to the diet. No vitamin E deficiencies were seen. The in vitro peroxide hemolysis values for the red blood cells of rats fed the higher levels of P fatty acids were low, indicating that the dietary fat provided sufficient tocopherol to protect from oxidation the unsaturated fatty acids in the erythrocyte membrane.

The authors conclude that a diet providing up to 33% of the calories as fat containing up to 28.5% P fatty acids, with a P/S ratio of up to 1.6:1, and a P to alpha-tocopherol ratio as high as 1780:1 causes no undesirable effects in the rat. [7 tables, 29 references] SW

7.522 A NEW APPROACH FOR SAMPLE PREPARATION OF PROTEIN HYDROLYZATES FOR AMINO ACID ANALYSIS

Spitz, Harvey D. (Johnson & Johnson Research Center, New Brunswick, N.J.)
Analytical Biochemistry 56, No. 1, 66-73 (Nov. 1973)

A traditional procedure for the determination of the amino-acid content of a protein involves: (1) hydrochloric acid hydrolysis of the protein, (2) removal of the hydrochloric acid under vacuum, (3) dissolving the residue in an acidic buffer solution, and (4) chromatographic separation of the amino acids by ion-exchange chromatography. This paper describes a method for preparing the samples of protein hydrolyzates for amino-acid analysis without the removal of the hydrochloric acid. By this technique, the available hydrochloric acid is neutralized (after the hydrolysis) with a buffer solution that neutralizes the acid and dilutes the sample hydrolyzate at the same time. The resulting solution is used for the amino-acid analysis, and it produces an amino-acid chromatogram having the same elution times and resolution as that produced by a mixture of amino acids in pH 2.2 sodium citrate buffer. This technique eliminates the phenomenon of artifact formation that can occur when hydrochloric acid is removed from protein hydrolyzates. The data also indicated that the amount of available hydrochloric acid in the final sample solution employed for amino-acid analysis can affect the resolution and the elution time of many of the amino acids found in a protein hydrolyzate.
[3 tables, 4 references] FTP

8. AMERICAN SPICE TRADE ASSOCIATION PUBLISHES NUTRIENT DATA ON SPICES

Anonymous
Food Product Development 7, No. 10, 48, 54 (Dec. 1973)

Although the nutrient level of spices taken in amounts of normal consumption is not significant, it may be likely that spices need be taken into account only in the most stringent diet and recipe planning. The American Spice Trade Association (ASTA) recently issued two charts giving the nutrient analysis of 35 common spices. The charts are reproduced in this article, but they may also be obtained for 5 cents each from the Information Bureau, ASTA, Empire State Bldg., New York, NY 10001. The data for each spice include weight per teaspoon and content of water, food energy value (calories), protein, fat, total carbohydrates, fiber, ash, calcium, phosphorus, sodium, potassium, iron, thiamine, riboflavin, niacin, ascorbic acid, and vitamin A value. Composition data are given on per teaspoon and per 100-gram bases.
[2 tables] FTP

8.53 (4.2)(4.83) COMPONENT FATTY ACIDS OF ASPERGILLUS TERREUS FAT

Singh, Jagjit, and Madan Gopal Sood (Applied Chemistry Section, Punjab Engineering College, Chandigarh, India)
Journal of the American Oil Chemists' Society 50, No. 12, 485-486 (Dec. 1973)

The authors previously reported [J. Sci. Food Agr. 23, 1113 (1972)] that the mold Aspergillus terreus Thom gave a high yield of lipid (51% of the product) when grown in an inorganic medium containing sucrose. In this present report, the authors determined the fatty acid composition of the lipid produced by the mold.

The mold growth was harvested after 10 days of culture. The dried mold mycelia were ground to a powder, extracted with a chloroform/methanol mixture, and dried. Methyl esters were prepared from the extracted lipid and then subjected to analysis by gas-liquid chromatography. The major fatty acids found in the lipid were (in percent of the lipid): myristic, 1.9; palmitic, 23.4; oleic, 14.1; linoleic, 39.4; and linolenic, 20.7. The combined proportion of linoleic and linolenic acids in the lipid was 60.1%; the proportion of the two fatty acids exceeds that required for a good drying oil. Drying oils are useful in the paint industry for preparing coatings that dry rapidly with a tough film.
[1 table, 8 references] SW

8.42 THE DETERMINATION OF MERCURY IN COMMERCIALLY IMPORTANT AQUATIC ORGANISMS

Ting, Robert Y., Owen H. Weeler, and Edith Robles de Irizarry (OMNI Research, Inc.)
Contribuciones Agropecuarias y Pesqueras, 5, No. 1 (Jan. 1973), 36 pp. (Servicios Auxiliares y Operaciones Centralizadas, Departamento de Agricultura, San Juan, Puerto Rico)

Considerable data are presented on the mercury content of the muscle and organs of commercially important fish and shellfish taken off Puerto Rico. About 2,000 samples were analyzed. The level of mercury in the muscle of the fish (except for the larger pelagic carnivorous species) and shellfish was below 0.5 p/m, the maximum permissible level permitted in food. In general, the kidneys, livers, and gall bladders of the fish contained higher levels of mercury than the muscle tissue. The fatty tissues usually contained a very low level of mercury, and the dark flesh (near lateral line of fish) showed lower levels than did the lighter muscle tissue. Herbivorous fish, generally, contained lower levels of mercury than the carnivorous fish of the same size category.
[1 figure, 3 tables, 5 references] FTP

8.8 (3.3344) (0.39) BLUEING DISCOLORATION IN CANNED CRAB MEAT (CANCER MAGISTER)

Babbitt, J. K., D. K. Law, and D. L. Crawford (Dept. of Food Science & Technol., Oregon State University Seafoods Laboratory, Astoria, OR 97103)
Journal of Food Science 38, No. 7, 1101-1103 (Nov.-Dec. 1973)

Canned crab meat may develop a blue discoloration which may be caused by the formation of melaninlike (pigmented) compounds. This paper reports on a study of the characteristics of the blueing reaction and on the nature of the discolored product. Separate lots of raw Dungeness crab meat were extracted with acetone and with trichloroacetic acid (TCA), and portions of each extracted lot were dialyzed against deionized water. Samples of the acetone-extracted and TCA-extracted and dialyzed crab meat were packed in C-enamel cans with solutions containing NaCl, L-dopa (3,4-dihydroxyphenylalanine), Fe_2SO_4, $CuCl_2$, citric acid, or ascorbic acid. The cans were vacuum sealed and retorted at 116° C for 55 min. The total phenolic content, copper content, pH, and degree of blueing were determined on the various samples as appropriate. The degree of discoloration was measured by a Gardner Automatic AC-2A Color Difference Meter.

More than 90% of the phenolic compounds were removed from the raw crab meat by extraction and dialysis treatments. TCA extraction reduced the copper content of the raw crab meat, but acetone extraction increased it. TCA extraction and to a lesser extent acetone extraction plus dialysis removed those substances that interact with iron or copper to cause blueing of the crab meat. When Cu^{+1}, Cu^{+2}, Fe^{+2}, and Fe^{+3} were added to the crab meat prior to canning, blue discoloration developed. However, when copper or iron was added to the TCA extracted crab meat, blueing did not occur. When dopa was added to the extracted and dialyzed

7.0 (7.42)(9.19) USE OF SPARK SOURCE MASS SPECTROSCOPY FOR THE DETERMINATION OF MERCURY IN FISH IN ENVIRONMENTAL SURVEILLANCE

Ball, D. F., M. Barber, and P. G. T. Vossen (Chem. Appl. Chem. Dep., Univ. Salford, Salford, England)
Chemical Abstracts 79, No. 25, 143252a (Dec. 24, 1973)

7.462 (6.3) DETERMINATION OF IODINE IN MARINE ALGAE

Dave, H. M., S. K. Naiya, N. N. Sharma, and K. Seshadri (Cent. Salt Mar. Chem. Res. Inst., Bhavnagar, India)
Chemical Abstracts 79, No. 21, 123311r (Nov. 26, 1973)

8.8 (3.3344) (0.39)

crab meat, particularly in the presence of copper or iron under alkaline conditions, the blue discoloration was formed.

The fact that the untreated crab meat had higher Gardner "L" values indicated that certain constituents in the crab meat may interfere with or inhibit the blueing. The acetone and TCA extractions may remove the reactive constituents involved in the blueing as well as the inhibitory substances.

Thus, the phenolic compounds in the crab meat seem to have a role in the blueing of canned crab meat. The total phenolic content of raw crab meat held at 2° C rose from 140.8 to 322.5 µg/g after 4 days; the pH changed from 6.65 to 7.65 during the same period.
[7 tables, 12 references] FTP

8. CHEMICAL AND NUTRITIVE VALUES OF SEVERAL FRESH AND CANNED FINFISH, CRUSTACEANS, AND MOLLUSKS. PART I: PROXIMATE COMPOSITION, CALCIUM, AND PHOSPHORUS

Sidwell, Virginia D., James C. Bonnet, and Elizabeth G. Zook (College Park Fishery Products Center, National Marine Fisheries Service, NOAA, College Park, MD 20740)
Marine Fisheries Review 35, No. 12, 16-19 (Dec. 1973)

Data are presented on the moisture, protein, fat, ash, calcium, and phosphorus content of the edible portion of 32 finfish, crustaceans, and mollusks. Information is given on the mean, standard error of the mean, and range of values, and on the number of samples analyzed. Data are given as follows: (1) The edible portion of raw finfish: catfish (cultured), catfish (wild), cod (Icelandic), cod (domestic), yellowtail flounder, haddock (inshore), Pacific hake, Pacific halibut, ocean perch, pollock, Pacific rockfish, red snapper, and whiting; (2) the edible portion of canned sockeye salmon, tuna in oil, and tuna in brine; and (3) the edible portion of raw mollusks: blue crab, king crab (body), king crab (leg), spiny lobster, Alaskan shrimp, Asian shrimp, brown shrimp, Maine shrimp, Mexican shrimp, white shrimp (Gulf of Mexico), white shrimp (South Atlantic), clams (hard shell), clams (soft shell), surf clams, oysters (Long Island), oysters (Maryland and Virginia), bay scallops, calico scallops, and sea scallops.

Reprints of this paper, MFR Paper 1022, may be obtained from the Technical Information Division D83, Environmental Sciences Information Center, NOAA, U.S. Dept. of Commerce, Washington, DC 20235.
[5 tables, 4 references] FTP

8.53 (4.13)(1.33) FATTY ACID CONTENT OF COHO SALMON, ONCORHYNCHUS KISUTCH--A STATISTICAL APPROACH TO CHANGES PRODUCED BY DIET

Tinsley, Ian J., Hugo M. Krueger, and James B. Saddler (Dept. of Agricultural Chemistry and of Fisheries and Wildlife, Oregon State University, Corvallis, OR 97331)
Journal of the Fisheries Research Board of Canada 30, No. 11, 1611-1666 (Nov. 1973)

In previous work, the authors examined the manner in which fatty acids are utilized in exercising fingerling salmon. They compared the fatty acid content of the exercised fish with that of unexercised (control) fish. The authors believe that these estimates of fatty acid utilization would be more precise if the initial amounts of fatty acids in the exercised fish were known with some certainty.

In the present study, a group of salmon were analyzed for length, weight, the time they were maintained on a specific diet, total fatty acid content, and identification of fatty acids present. Mathematical equations were developed to express the quantity of a particular fatty acid in a fish as a function of its length and the time that it was held in the laboratory. Using these equations the fatty acid content of individual fish could be predicted with a fair degree of precision. Under specified conditions, fish at 8-cm length were increasing in weight at the rate of 30 mg daily, and the fatty acid content was increasing at the rate of 7.3 mg daily. Data gained from these analyses caused the authors to presume that acid 22:6 is laid down in amounts determined mainly by the size of the fish rather than the availability of the fatty acid in the diet. The authors then reviewed some of the literature which snowed that the 22:6 acid is unique in the metabolism of fish.
[2 figures, 2 tables, 8 references] SW

8.8 QUALITY COMPARISONS OF ALBINO AND REGULAR (GRAY) CHANNEL CATFISH

Heaton, E. K., T. S. Boggess, Jr., and R. E. Worthington (Dept. of Food Science, Georgia Station, Experiment, GA 30212), and T. K. Hill
Journal of Food Science 38, No. 7, 1194-1196 (Nov.-Dec. 1973)

The yield and quality of cage-cultured regular and albino catfish were determined and compared. The fish were harvested at mean live weights of about 0.25, 0.50, 0.75, and 1.00 lb. In preparation for processing, the fish were immobilized by electric shock treatment. The fish were skinned and eviscerated by hand. Data were obtained on dress-out yields and percentage of head, viscera, visceral fat, skin, and miscellaneous waste. Moisture and fat determinations were made on the raw and cooked flesh. Texture measurements and organoleptic evaluations were made on the cooked fish.

The mean values for the regular catfish for the four size categories were: live weight, 0.67 lb; dress out, 59.35 %; head, 19.53%; skin, 6.43%; viscera, 7.63%; visceral fat, 6.05%; and miscellaneous waste, 1.03%. The differences in dressing percentages associated with the size of the fish or harvest date of the two strains of catfish were not significant. The percentages of head, skin, and viscera decreased and the percentage of visceral fat increased with the increase in size of the fish within the range of sizes examined. The total fat content of the raw flesh was about the same for all sizes of catfish, but the fat content of the cooked flesh was progressively higher with increasing size of fish. The members of the panel preferred the albino catfish to the regular catfish primarily because of its whiter color. In general, the panel rated higher the samples

9.1 CHARACTERIZATION OF THE OPTIMUM DATA ACQUISITION AND MANAGEMENT OF A SALMON FISHERY AS A STOCHASTIC DYNAMIC PROGRAM

Lord, Gary E. (Fisheries Research Institute, University of Washington, Seattle, WA 98195)
Fishery Bulletin 71, No. 4, 1029-1037 (Oct. 1973)

The management and inshore harvesting of salmon stocks characteristically consist of several interrelated phases. Stock assessment and run profiling are of importance both to the management personnel and to segments of the industry in planning their respective operations. Prior knowledge of the run size and time profile is useful in the preliminary planning of a management strategy that will in some way permit the escapement of the desired number of spawners. Similarly, such information also serves the industry in planning the level of its anticipated activities. The theoretical investigation described here was motivated by specific consideration of the data gathering and management schemes currently applied in the Bristol Bay sockeye salmon fisheries. However, the formulation is relatively abstract and of sufficient generality so that, properly interpreted, it may apply to a variety of fishery situations which are evolutionary or time varying in nature.

The optimum data acquisition and management of a typical Bristol Bay sockeye salmon fishery have been expressed as a problem in statistical decision theory. Optimality has been defined as that set of sequential decision rules that minimizes the Bay's risk over the duration of the run. Economic losses or costs are

9.12 SEA GRASSES AT KHOR UMAIRA, PEOPLE'S DEMOCRATIC REPUBLIC OF YEMEN WITH REFERENCE TO THEIR ROLE IN THE DIET OF THE GREEN TURTLE, CHELONIA MYDAS

Hirth, Harold F., Lionel G. Klikoff, and K. T. Harper (Dept. of Biology, University of Utah, Salt Lake City, UT 84112)
Fishery Bulletin 71, No. 4, 1093-1097 (Oct. 1973)

Sea grass meadows are productive and important marine communities. Besides stabilizing the substrate, sea grasses provide cover and are a source of food for a number of marine invertebrates and vertebrates. The leaves also support a variety of epiphytes and the grass debris serves as the energy base for detritus food chains. The green turtle has been proposed as a candidate for marine ranching by fencing them in underwater spermatophyte pastures. The purposes of this paper are to describe some basic parameters of the sea grass pastures at Khor Umaira in the People's Democratic Republic of Yemen and to provide basic data aimed at answering the question, "What are the characteristics of good green turtle feeding pastures?"

Studies were made on the sea grass pastures at Khor Umaira (an arm of the Gulf of Aden) in July 1972. The standing crop in an equally mixed pasture of Cymodocea serrulata and Syringodium isoetifolium was greater than that in a pure stand of C. serrulata. The average caloric content of the leaves of five genera of sea grasses at Khor Umaira ranged between 4.54 and 4.66 kcal/g dry wt, ash free. These values are similar to those reported for sea grasses in the South Pacific and in the Caribbean. Our results show that the number of calories in

9.13 STUDIES ON THE STEROL METABOLISM IN MARINE CRUSTACEANS (0.36)

Teshima, Shin-ichi (Laboratory of Fisheries Chemistry, Faculty of Kagoshima, Kagoshima, Japan)
Memoirs of Faculty of Fisheries Kagoshima University 21, No. 2, 69-147 (Dec. 1972)

Animals, plants, and microorganisms contain sterols as a constituent of their lipids. The more primitive species of the animal kingdom, such as marine invertebrates, contain a variety of sterols while the higher animals often only contain cholesterol. The purpose of this study was to obtain a better understanding of the composition of naturally occurring sterols, sterol-synthesizing ability, nutritional requirements for sterols, and in vivo transformation of sterol molecules in marine crustaceans. To obtain this information, the author examined the distribution and fate of exogenous cholesterol in the tissues and the biosynthesis of steroid hormones from cholesterol and progesterone in the lobster or the crab.

The lobster (Panulirus japonica), crab (Portunus trituberculatus), and three species of mantis crab (Gonodactylus chiragra, G. falcatus, and G. scyllarus) contained only cholesterol as a sterol. The prawn (Penaeus japonicus) contained 90% of its sterol as cholesterol, the Amphipoda (Caprella sp.) contained 73%, and the Mysidacea (Neomysis intermedia) contained 78%. The last three organisms also contained other sterols including 22-dehydrocholesterol, brassicasterol, desmosterol, 24-methylenecholesterol, stigmasterol, and β-sitosterol.

The lobster, prawn, crab, and Artemia salina were able to incorporate acetate-1-^{14}C into the fatty acids and some nonsaponifiable materials but not into sterols.

9.1

ascribed to acquisition of catch and escapement data in such a manner that an optimal data acquisition scheme can be defined in addition to defining the set of optimal management strategies.
[7 references] Reprinted in part

9.1 A GENERAL LIFE HISTORY EXPLOITED POPULATION SIMULATOR WITH PANDALID SHRIMP AS AN EXAMPLE

Fox, William W., Jr. (Southwest Fisheries Center, National Marine Fisheries Service, NOAA, La Jolla, CA 92037)
Fishery Bulletin 71, No. 4, 1019-1028 (Oct. 1973)

A general life history population simulator, the FORTRAN IV computer simulation model GXPOPS, with provisions to exploit any age sector of the population is presented. In addition to the usual fish life history pattern, the model allows simulation of random mating, sex-differential maturation, and stepwise growth found in many crustacean and some fish populations. GXPOPS provides for monthly calculations and all rates may be as general as month specific. The generality of the model is illustrated with an examination of closed season management strategies for a pandalid shrimp population.
[3 figures, 3 tables, 13 references] [Author's abstract slightly edited]

9.13 (0.36)

Apparently, these organisms lack sterol-synthesizing ability or their biosynthesis of sterols proceeds extremely slowly.

Prawns fed a cholesterol-containing diet showed a normal growth rate but those fed a sterol-free diet had a poor growth rate. Apparently, the prawn requires sterols in its diet for normal growth.

The Artemia and crab were capable of converting ergosterol to cholesterol possibly by way of intermediates, brassicasterol and/or 24-methylcholesterol. Furthermore, the prawn was able to digest ergosterol, stigmasterol, and β-sitosterol and convert them to cholesterol. Any possible conversion of desmosterol and 24-methylcholesterol proceeded relatively slowly. Most marine crustaceans can convert some C_{28}- and C_{29}-sterols to cholesterol.

The hepatopancreas and gonads may be significant sites for the metabolism of exogenous cholesterol in crustaceans. Because marine crustaceans contain relatively high amounts of sterols and require cholesterol or other sterols and are lacking in sterol-synthesizing ability and because of the presence of enzyme systems for the biosynthesis of steroid hormones in the crab, the author believes that some steroids formed from cholesterol probably possess certain physiological activity similar to hormones in marine crustaceans and in mammals.
[31 figures, 46 tables, 119 references] FTP

8.8

prepared from the 0.50- and 0.75-lb live-weight fish to those of other sizes (0.25 lb and 1.00 lb).

Data are given on the fatty acid content of the muscle tissue of the two strains of catfish. There was a significant difference in the content of only one fatty acid, tentatively identified as heptadecenoic acid (17:1), between the two strains; the muscle tissue from the albino catfish showed a slightly higher level.

The results indicated that: (1) the fish samples prepared from the live fish weighing about 0.50 and 0.75 lb were preferred and seemed to be easier to handle in processing; (2) the small fish were tender and difficult to skin; and (3) the largest fish size group tested (about 1.0 lb) were easier to handle and appeared more suitable for baking or broiling.
[4 tables, 8 references] FTP

9.12

the standing crop can be calculated from estimation of percent cover. The role of sea grasses in the management schemes of the green turtle is described.

Before turtle ranching can become a reality, studies are needed on the energy provided by epiphytes and animal prey. It is likely that green turtles obtain some nutritional value from the epiphytic organisms on the sea grass leaves. Further, the digestive processes of green turtles ought to be examined in relation to the protein content of sea grasses and other food. Occasionally, it has been observed that adult green turtles have eaten invertebrates (viz. crustacea, snails, jellyfish, sponges). The importance of these animals to the nutrition of green turtles has yet to be determined. Studies on the effect of different intensities of turtle grazing on the sea grass community are also needed, especially if under high grazing pressure the entire plant is pulled up.
[3 figures, 1 table, 13 references] Reprinted in part

9.1 CHEMICAL ACTIVATION OF FEEDING ON THE CARIBBEAN REEF-BUILDING CORAL MONTASTREA CAVERNOSA

Lehman, John T., and James W. Porter (Haskins Lab., Yale Univ., New Haven, Conn.)
Chemical Abstracts 79, No. 21, 124010d (Nov. 26, 1973)

9.15 DISEASES OF POND FISHES

Bauer, O. N., V. A. Musselius, and Yu. A. Strelkov
Published by John Wiley & Sons, New York (1973), Price £9-85 [Translated from Russian]
Aquatic Sciences & Fisheries Abstracts 3, No. 11, 154, Abstract No. 3Q11756F (Nov. 1973)

The most important infections, parasitic diseases, and communicable diseases of pond fishes are described. The main emphasis is on plant feeding species of fish and whitefishes. Effective biological and chemical methods of control of diseases are described. FTP

9.16 BRACKISHWATER AQUACULTURE IN THE MEDITERRANEAN REGION
(1.0148)
(1.0149)

(Authors and titles are shown below)
Studies and Reviews No. 52, 127 pp. (1973). Prepared by General Fisheries Council for the Mediterranean of Food and Agriculture Organization of the United Nations, Via delle Terme di Caracalla, 00100 Rome, Italy.

This study is a collection of 14 articles on the aquaculture of various species at locations on the Mediterranean Sea. The articles include the following: "Present State of Aquaculture in the Mediterranean and South Atlantic Coasts of Spain," by J. M. San Feliu (pp. 3-23). The subjects covered include: the cultivation of the mussel (Mytilus edulis) in various provinces in Spain; cultivation of two oysters (Ostrea edulis, Crassostrea angulata), and eels; cleansing of lamellibranchs; production in confined coastal waters; government research activities; and possibilities for expanding, intensifying, and diversifying pisciculture in Spain. "General Situation of Aquaculture in France," by Pierre Rouzaud (pp. 27-32). The first subject deals with planning, carrying out, and applying the results of research in aquaculture; the second subject covers future studies and development.

"The Growth of Oyster (Ostrea edulis L.) and Mussel (Mytilus galloprovincialis Lmk.) in Cultured Beds in the Northern Adriatic Sea," by Mirjana Hrs-Brenko and Želimir Filić (pp. 37-45). This article is on the growth of two commercial bivalve species and the suitability of several localities in Yugoslavia as sites for aquaculture.

9.17 THE CHESAPEAKE BAY IN MARYLAND:
(1.0116)(9.6) AN ATLAS OF NATURAL RESOURCES

Lippson, Alice Jane (editor)
Johns Hopkins University Press, Baltimore (1973), 55 pp.

Twenty-four authors have contributed 25 articles to this book. The book is a summary of the aquatic flora and fauna of Maryland. The physical aspects of the bay are covered in the chapters that describe the body of water; depths, tides, and currents; salinity; sediments; and marshes. The plants are described in the chapters on the rooted plants and the microscopic plants (phytoplankton). Microscopic animals (copepods) and jellyfish are covered in two chapters. The shellfish are described in chapters on clams, oysters, and their predators. There are chapters on blue crabs; herrings; eels; catfishes; white perch; striped bass; yellow perch; bluefish; spot, croaker, and weakfish; Atlantic silverside and northern puffer; winter flounder; and hogchoker and bay anchovy. The birds are covered in chapters on ducks, geese, and swans. There is a short bibliography that includes books, journal articles, pamphlets, and reports. The physical aspects of the bay are illustrated with charts and graphs. The organisms--plants, plankton, shellfish, crabs, fish, and birds--are illustrated with locators on maps of the Chesapeake Bay area. SW

9.17 THE MATHEMATICAL THEORY OF THE DYNAMICS OF BIOLOGICAL
(9.6) POPULATIONS

Bartlett, M. S., and R. W. Hiorns (editors)
Academic Press, Inc., New York (1973), 347 pp.

This book is based on a conference organized by the Institute of Mathematics and Its Applications in association with the Institute of Biology. The conference was held in Oxford, England, Sept. 1972. The subject matter of the conference was based on the mathematical theory of time-change in animal populations including land animals (and humans), fishes, insects, and microorganisms. References to actual migrations in space or to changes in size and structure were included in the considerations. There are five main parts to the book. Part I has three papers on "Population Processes in Time"; part II is on "Population Processes in Space," with four papers; part III covers "Population Genetics," with four papers, part IV is on "Estimation and Simulation Problems," with four papers; and part V is on "Population Distribution and Community Structure," with four papers. Twenty-two authors prepared the articles; each article is complete with references; and there are author and subject indices. SW

9.16 (1.0148)(1.0149)

"The Relationship Between Reproductive Cycle and Index of Condition of the Mussel, Mytilus galloprovincialis, in the Northern Adriatic Sea," by Mirjana Hrs-Brenko (pp. 47-52). This article is a report on the seasonal fluctuations of condition of the mussel relative to the spawning season in Yugoslavia. "Gonad Development, Spawning and Rearing of Mytilus sp. Larvae in the Laboratory," by Mirjana Hrs-Brenko (pp. 53-65). This report covers conditions needed to stimulate gonadal development of the mussel. These experiments were carried out in laboratories in Yugoslavia and the United States.

"Growth of Oysters According to Depth," by Dinko Morović and Ante Šimunović (pp. 67-71). The relationship between water depth and increase in length and weight of oysters was studied in Yugoslavia. "Observations on the Growth of Juveniles of Dicentrarchus labrax (Linné) and Dicentrarchus punctatus (Bloch) Placed in a Natural Environment and Fed Artificially," by Loïc Pouliquen (pp. 73-80). This article discusses the promising results of feeding these fishes under aquaculture conditions in France. "Preliminary Study on the Protein Requirements of the Gilthead Bream (Chrysophrys aurata)," by P. Luquet and J. J. Sabaut (pp. 81-89). This article is a report on nutritional requirements of the gilthead bream in France. "Preliminary Note on the Essential Amino Acids of the Sea Bass Dicentrarchus labrax Linné)," by R. M. Metailler, A. Febvre, and E. Alliot (pp. 91-96). This is a study of amino-acid requirements of the sea bass. "General Aspects of Shrimp Culture," by H. J. Ceccaldi (pp.97-104). This article discusses breeding and other biological aspects of shrimp culture in France.

"Techniques of Artificial Rearing of Crustaceans," by J. M. San Feliu, F. Muñoz, and M. Alcaraz (pp. 105-121). This is a review of aquaculture in Spain and other Mediterranean coasts. "Variations in Free Amino Acids in Penaeus kerathurus During the Period Between Moults and During Periods of Fasting," by C. Torres (pp. 123-127). The free amino acids were determined in shrimp in France. SW

9.15 (1.32)(1.37) FISH VIRUSES: ISOLATION OF INFECTIOUS HEMATOPOIETIC NECROSIS IN EASTERN NORTH AMERICA

Wolf, Ken, M. C. Quimby, L. L. Pettijohn, and M. L. Landolt (Eastern Fish Disease Laboratory, Kearneysville, WV 25430)
Journal of the Fisheries Research Board of Canada 30, No. 11, 1625-1627 (Nov. 1973)

This report documents the occurrence of infectious hematopoietic necrosis (IHN) in eastern North America. This acute viral disease of young sockeye salmon and rainbow trout has occurred chiefly in the Pacific Northwest. During July 1972, a group of fingerling rainbow trout, at a commercial hatchery in West Virginia, had a 60% loss over a 2-week period. The young fish originated from eggs that had been shipped from a source in the Pacific Northwest.

The IHN virus was isolated from the diseased fingerlings and presumptively identified by plaque characteristics. Clinical signs, histopathological findings, and origin of the eggs provided a basis for the diagnosis. Serum neutralization test results gave positive identification of the IHN virus, and electronmicroscopy showed its morphology to be of the rhabdovirus variety. Experimental infections in test fish, caused by isolates from the infected fish, resulted in signs of IHN and death. Specimens from the infected test fish had characteristic histopathology and virus titers. The authors suggest that epizootiological evidence favors the interpretation that IHN virus was transported from the Pacific Northwest with eggs; they know that the eggs were not disinfected upon receipt.
[1 figure, 1 table, 11 references] SW

9.17 BEVERTON-HOLT MODEL OF A COMMERCIAL FISHERY: OPTIMAL DYNAMICS

Clark, Collin, Gordon Edwards, and Michael Friedlaender (Dept. of Mathematics, University of British Columbia, Vancouver, British Columbia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 11, 1629-1640 (Nov. 1973)

In discussing the optimal management of a fishery, the most frequent interpretation of "optimal management" is found in the concept of "maximum sustainable yield." But the authors believe that the concept has serious limitations as a criterion for resource management because it is not an economic concept. Instead, they suggest that the "maximization of economic benefits" should be considered. Using this concept, a rational management policy will attempt to maximize the total present value of all profits, present and future, from a fishery. The entire management policy of the fishery can then be determined on this basis because it provides for cost-benefit analysis in which the factors relating to income and investment can be quantified.

The authors also discuss a dynamic single year-class model, for use in fishery management, after the model described by R. J. H. Beverton, and S. J. Holt [Minist. Agr. Fish. Food London, Fish. Invest. Ser. 2, No. 19, 553 pp. (1957)]. Based on the model, the age at which fish should be caught and the intensity of fishing at each age can be specified. In addition, the optimal dynamics of fishery management, in which conglomerate year-classes and sequential year-classes of fish populations are exploited, are discussed.
[9 figures, 12 references] SW

9.17 ECOLOGY OF A NEW ENGLAND SALT MARSH

Nixon, Scott W., and Candace A. Oviatt (Graduate School of Oceanography, University of Rhode Island, Kingston, RI 02881)
Ecological Monographs 43, No. 4, 463-498 (Autumn 1973)

New England marshes tend to be small with a heavy peat substrate; marshes south of New Jersey are better developed and characterized by mineral sediments. Energy flow diagrams of a New England salt marsh were developed through measuring the abundance of major populations, their metabolism, and the total system metabolism throughout a year. Analysis of the annual ecological energy budget of the marsh indicates that consumption exceeds production; therefore, the system must depend on inputs of organic detritus from marsh grasses.

Populations of shrimp and fish in the marsh were largest in the fall. Birds were most abundant in the winter and spring. Although the numbers of shrimp and fish were large, there was no evidence that the marsh exported large amounts of these animals to the estuary.

The production of aboveground grasses on the marsh was lower than production reported in a southern marsh. A simulation model, based on laboratory and field metabolism and biomass measurements of parts of the marsh system, was developed to predict diurnal patterns of dissolved oxygen in the marsh. The model was verified by comparing it to field measurements of diurnal oxygen curves. The model also indicated the importance of the timing of high tides in determining oxygen levels; in addition, it was used to explore the effects of simulated additions of sewage biological oxygen demand and increases in temperature.
[27 figures, 18 tables, 101 references] SW

9.19 FACTORS AFFECTING THE BEHAVIOR OF FIVE CHLORINATED HYDROCARBONS IN TWO NATURAL WATERS AND THEIR SEDIMENTS

Oloffs, P. C., L. J. Albright, S. Y. Szeto, and J. Lau (Dept. of Biological Sciences, Simon Fraser University, Burnaby 2, British Columbia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 11, 1619-1623 (Nov. 1973)

The means by which persistent chemicals are moved from points of release (such as sewage outfalls, surface runoff, rivers, and the atmosphere) to the open ocean are not well understood. Experiments were conducted to determine the factors found in natural conditions and their effects on the behavior of chlorinated hydrocarbon residues in natural waters.

Water samples and bottom sediments were taken from the Fraser River and Georgia Strait. In one experiment, the water samples and their sediments were incubated for 6 and 12 weeks at 13° C individually with alpha chlordane, gamma chlordane, lindane, DDT, and a PCB (Aroclor 1260). With the exception of lindane, all detectable residues had moved from the water to the underlying sediment after 6 and 12 weeks. Most of the lindane could not be recovered; the authors suggest that it was metabolized by microorganisms in the sediment, since 96% of the lindane was recovered from sterilized waters and sediments after incubation. No residues were found to escape to the atmosphere. In another experiment, sediments and waters were sterilized and incubated with DDT and DDD. After 12 weeks most of the DDT was recovered from the sediments; most of the DDD was recovered from the sediments after 6 and 12 weeks.

The effects of agitation and the presence of a surface-active agent on the disappearance of organochlorines from water was investigated. Twenty samples of

9.19 EFFECT OF p,p'-DDT ON DEVELOPMENTAL STABILITY OF PECTORAL FIN RAYS IN THE GRUNION, LEURESTHES TENUIS

Valentine, David W. (Dept. of Biology, University of California, San Diego, La Jolla, CA 92037), and Michael Soulé
Fishery Bulletin 71, No. 4, 921-926 (Oct. 1973)

It was previously proposed that asymmetry of bilateral characters may serve as a morphological measure of environmental stress in fish populations. Under this concept, various environmental stresses may reduce the efficiency of developmental homeostatic mechanisms and lead to an average increase in the within-individual variation of morphological structures. Thus asymmetry values might serve as an index of the physiological stress to which a fish population is being subjected. This study involved experiments that tested the validity and utility of using bilateral asymmetry for the early detection of environmental deterioration. The grunion was used as the test organism and p,p'-DDT[1,1,1-trichloro-2,2-bis (p-chlorophenyl)ethane] was used as the test toxicant.

The first experiment, using a continuously flowing water system, was designed to test the effects of a ubiquitous pollutant, p,p'-DDT, on the pectoral fin ray asymmetry of grunion, Leuresthes tenuis, fry. Toxicant concentrations ranged from a low of 0.001 to a high of 500 parts per billion. The two highest p,p'-DDT concentrations, 100 and 500 parts per billion, proved lethal to grunion fry. For the other concentrations, increases in pectoral fin ray asymmetry with increasing toxicant concentration were observed. Increases in asymmetry were statistically significant.

9.19 (7.45) METHYLATED FORMS OF ARSENIC IN THE ENVIRONMENT

Braman, Robert S., and Craig C. Foreback (Dept. of Chemistry, University of South Florida, Tampa, FL 33610)
Science 182, No. 4118, 1247-1249 (Dec. 21, 1973)

Procedures were developed for the determination, in aqueous solutions, of various forms of arsenic such as the arsenite and arsenate ions, methylarsonic acid, and dimethylarsinic acid. The methods have high specificity at low limits of detection near 1 ng, and they depend upon pH selective reduction reactions with sodium borohydride followed by separation (in a cold trap) of the volatile arsines produced. The AsIII ion is the only arsenic form reduced to arsine by sodium borohydride at pH 4 to 9. AsV ions must first be reduced to the AsIII ions by sodium cyanoborohydride at pH 1 to 2 before they can be reduced to arsine by sodium borohydride at pH 1 to 2. The authors suggest that the pH requirements of the reduction reactions indicate the various acids must be in the completely undissociated form before they can be reduced to the corresponding arsines.

These procedures have been applied to the analysis of water in the environment. Tests of water from rivers, lakes, and ponds in the vicinity of Tampa, Fla., indicated the presence of methylarsonic acid and dimethylarsinic acid. The river water contained lower concentrations of these methylated arsenic compounds than the lakes and ponds.

The analytical methods were adapted to the analysis of urine. The results of the analyses of urine samples indicated the presence of methylarsonic and dimethylarsinic acids. The authors suggest that detoxification of arsenic occurs

9.19 OCEAN DUMPING IN THE NEW YORK BIGHT: AN ASSESSMENT OF ENVIRONMENTAL STUDIES

Pararas-Carayannis, George (U.S. Army, Corps of Engineers, Coastal Engineering Research Center, Fort Belvoir, Va.)
Technical Memorandum No. 39, 159 pp. (May 1973). U.S. Army, Corps of Engineers, Coastal Engineering Research Center. Available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22151. Price $3.00; $0.95 for microfiche copy.

Short-term investigations relating to the effects of ocean dumping were performed for the Coastal Engineering Research Center (CERC) of the Corps of Engineers. Hydrographic, geological, chemical, and biological studies were included; and the feasibility was investigated for a remote-controlled electronic sensing system that could detect the location and status of waste disposal vessels operating in the New York Bight. Through this method regulatory agencies could keep these vessels under surveillance. The studies include analyses of sediment and biological samples; marine life, bacteria, and waste disposal; and the impact of dumping on ecology, water quality, and the environment.

A summary of 17 congressional acts relating to ocean dumping is provided. Trends in ocean dumping compiled by the CERC indicate an increase in the quantity of waste disposed in U.S. coastal waters. Furthermore, 62% of all ocean dumping occurs along the Atlantic coast, and dredge spoils constitute 84% of the material. Disposal areas in the Atlantic Ocean off the entrance to New York Harbor were established by an act of Congress in 1888. Sites for dumping of selected materials were established many years ago in locations where, it was considered, they

9.19 (7.45)

as a consequence of the body methylation reactions. In addition, dimethylarsinic acid is ubiquitous in the environment and is particularly involved in biological systems. Because the compound is resistant to oxidation it could have a long residence time in natural waters unless subjected to bacterial action. SW

9.19 (1.9) PARAMETERS NECESSARY FOR ANALYZING THERMAL BIO-ASSAYS ON MARINE FISH

Smith, R. D.
J. Sanit. Engng. Div. Am. Soc. Civ. Engrs. 98, SA6, 973-985 (1972). Pap. No. 9440
Water Pollution Abstracts 46, No. 1, 28, Abstract No. 163 (Jan. 1973)

Fraser River water were prepared without bottom sediment. A nonionic surface-active agent was added to 10 of the samples and gamma chlordane was added to the 20 samples.

The flasks were incubated up to 12 weeks; 5 of the flasks containing the added surfactant and 5 of the flasks containing no surfactant were swirled once every 24 h during the incubation period. The results indicate that the presence of the surfactant inhibited the movement of the gamma chlordane to the water-air interface in the absence of sediment. Swirling had no effect. These results suggest that the behavior of organochlorines in sewage outfalls or in water near cities may be quite different from that in other natural waters.
[3 tables, 5 references] SW

9.19 (3.33) CHARACTERIZATION OF WASTE WATER BY CATALASE ACTIVITY

Maffei, Constanta (Inst. Cercet. Project. Aliment., Bucharest, Romania)
Chemical Abstracts 79, No. 18, 107941r (Nov. 5, 1973)

would not be hazards to navigation, and would avoid offensive discoloration and solids washing up on the beaches. The disposal areas are definite geographical locations in the New York Bight for each material and include sites for mud, cellar dirt, sewer sludge, wrecks, waste acid, and chemicals. The effects of ocean dumping in other areas is also covered.
[50 figures, 21 tables, 75 references] SW

9.19 (1.69) RADIATION DOSE RECEIVED BY PLAICE (PLEURONECTES PLATESSA) FROM THE WASTE DISCHARGED INTO THE NORTH-EAST IRISH SEA FROM THE FUEL REPROCESSING PLANT AT WINDSCALE

Woodhead, D. S. (Fish. Radiobiol. Lab., Minist. Agric. Fish. Food, Lowestoft/Suffolk, England)
Chemical Abstracts 79, No. 21, 123128m (Nov. 26, 1973)

9.19

The second experiment, which utilized a recirculating static water system, was designed to determine inherent differences in the level of pectoral ray asymmetry in fish from different localities. Results for grunion fry paralleled previously published results for adult grunion. Grunion from the relatively polluted southern California region had higher asymmetry levels than did those from Baja California [Mexico]. The significance of these results as they relate to the general question of asymmetry as a statistical indicator of environmental stress is discussed.
[2 tables, 18 references] [Partly abstracted, partly reprinted]

9.19 DETERMINATION OF CHLORINATED BIPHENYLS AND CHLORIDE PESTICIDES

Zimmerli, B., B. Marek, and H. Sulser (Sekt. Pestizide Kontaminationen, Eidg. Gesundheitsamt., Bern, Switzerland)
Chemical Abstracts 79, No. 21, 124762a (Nov. 26, 1973)

9.19 (9.3) SOME SECOND THOUGHTS ON STOCKHOLM

Udall, Stewart L.
American University Law Review 22, No. 4, 717-732 (Summer 1973)

The author comments on the United Nations Conference on the Human Environment held in Stockholm, Sweden, in June of 1972. During the Conference it became apparent that the large ecological issues were being shunted aside in a political contest between the poor nations and their affluent neighbors. Further divisiveness resulted when five nations boycotted the Conference. During the process, a cautious aura of compromise was substituted for bold action and the Conference became a contest of ideological strength rather than a focus for the hopes of mankind. The author suggests that realism requires that failure of the Conference be acknowledged and that steps be taken to assess reasonable action alternatives for the future.

The innocuous declarations and vague agreements at the Conference attest to the unwillingness of nations to subordinate their narrow interests to our global ecosystem. History will judge the Conference as a missed opportunity, a failure to think holistically and to identify the approaching perils of global catastrophes. The author believes that before the end of this century, critical impacts on the biosphere will force creation of a new organization which can act to save the viability of the Earth as a fit habitat for human endeavor.

Certain events have already demonstrated the shortcomings of the Conference "solutions." At the Conference a 10-year moratorium on whaling was recommended;

9.19 ON THE EFFECTS OF DUMPED ORGANIC INDUSTRIAL WASTE DERIVING FROM THE PRODUCTION OF PROTEOLYTIC ENZYMES ON DENSITY, DISTRIBUTION AND QUALITY OF FISH AND SHRIMPS

De Clerck, R., J. Van de Velde, and W. Vyncke (Ministry of Agriculture, Fisheries Research Station, Ostend, Belgium)
Aquaculture 2, No. 4, 323-335 (Dec. 1973)

The author reported on a 1-year study of the effects of dumped industrial organic waste (from the production of proteolytic enzymes) on the fish and shrimp stocks of the area. The dumping ground was about 8 miles off the Belgian coast. The dumped wastes seemed to have no adverse effect on the fish and shrimp stocks. Further tests with shrimp in an aquarium showed that the waste material had no effect on the quality and shelf life of the shrimp product.
[7 figures, 1 table, 13 references] FTP

9.19 LABORATORY STUDIES OF THE ACCOMMODATION OF SOME CRUDE AND RESIDUAL FUEL OILS IN SEA WATER

Gordon, Donald C., Jr., Paul D. Keizer, and Nicholas J. Prouse (Fisheries Research Board of Canada, Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 11, 1611-1618 (Nov. 1973)

Reports of earlier work indicate that the solubility of petroleum in water is limited; furthermore, fine dispersions and discrete particles of petroleum can be formed in water. A measurable portion of any petroleum spilled into the sea is expected to enter the water column where it may contact marine organisms. A series of laboratory experiments were performed to elucidate the potential availability of petroleum products to marine organisms. The petroleum products tested were Venezuelan crude oil, No. 2 fuel oil, and No. 6 fuel oil.

Results of the tests indicate that the three oils produced similar amounts of total oil in sea water, but the ratio of particulate to subparticulate oil varied. No. 6 fuel oil produced the highest particulate oil concentrations, and the crude oil produced the highest concentrations of subparticulates. Most of the oil that appeared in the sea water was particulate in form; particles larger than 2 μ were found at a concentration of 439 μg/l; in the same experiment the average concentration of particles larger than 1 μ was 685 μg/l. The exact nature of these particles is unknown, but the authors surmise that they are small droplets of oil, in agreement with an earlier worker who made this suggestion.

9.2 (2.3) PROFIT BY CAMERAS. SEAFOOD PROCESSING TIME/MOTION STUDIES FOR DESIGN OF BETTER SYSTEMS

Engesser, William F., Randy Conrads, Paul Willis, Chi Cheung, Randy Peterson, and Willie Mercer
Circular No. 47, Engineering Experiment Station, Oregon State University, Corvallis, OR 97331 (1973), 25 pp.

The authors demonstrated how camera-recorded operations can be used to define and measure seafood processing operations for immediate-profit goals and for planning long-range benefits. By use of standard-cost data developed from camera studies of pink shrimp, bottomfish, Dungeness crab, and tanner crab processing operations, they identify actual and proposed benefits. Also, the report contains camera studies of a current blue crab processing operation in Louisiana and offers predictions of future improvements from the production data.
[Illustrated] FTP

9.19

The results of these laboratory experiments can be used to estimate the highest concentrations of oil that can appear in water under different environmental conditions after a petroleum spill. The authors compared the data from these experiments with observations made after an actual crude oil spill and found close agreement between the two.
[5 figures, 6 tables, 11 references] SW

Perkins, E. J., E. Gibbon, and J. W. M. Logan (Mar. Lab., Univ. Stratchclyde, Garelochhead/Dunbartonshire, Scotland)
Chemical Abstracts 79, No. 25, 143293q (Dec. 24, 1973)

9.19 OIL DISPERSANT TOXICITY

9.2 AMERICAN FISHERMEN ARE MISSING THE BOAT

Alexander, Tom
Fortune 88, No. 3, 192-197, 244, 248 (Sept. 1973)

The American fishing industry is being outfished on its home grounds and outsold in its home markets. The mainly obsolete equipment and small boats of our domestic industry are no match for the efficient foreign factoryship fleets. Although U.S. consumption of fish has increased during the past 25 years, the domestic catch has not significantly increased. About two-thirds of the U.S. supply of fishery products is imported, contributing $1.1 billion to the balance-of-trade deficit. And prices of fish in the markets are soaring; fresh fillets of some species now cost more per pound than certain choice cuts of beef.

Congress is considering protectionist legislation. A promising opportunity for resolution of worldwide fishing problems may be in the law-of-the-sea conferences. Real help to the U.S. industry exists in the scrapping of some old laws that promote inefficiency, reforming ill-conceived labor practices, and establishment of sensible international arrangements. The domestic industry might also organize itself more rationally, resulting in more modern fishing fleets.
[illustrated] FTP

Dale, I. M., and M. S. Baxter (Dep. Chem., Univ. Glasgow, Glasgow, Scotland)
Chemical Abstracts 79, No. 21, 122367b (Nov. 26, 1973)

9.19 MERCURY IN SEABIRDS

9.19 (9.3)

yet 2-weeks later the International Whaling Commission voted down the proposed worldwide ban on whale killing and later again rejected the ban at its next annual meeting.

The author discusses his earlier proposal that the United Nations establish an "Institute for Planetary Survival" which would be action oriented and would be funded by assessments against the members of the United Nations; assessments would be geared to the energy-consuming industrial activities of nations. This Institute would have in a single agency all facets of the international efforts to cope with the ecological crisis. The agency would monitor environmental threats, interpret and assess the data and disseminate its conclusions freely and regularly, and would develop corrective action plans to meet such threats. Its scope would range from human settlement to preservation of endangered species. The governing body of the Institute would be expert and interdisciplinary and appointed by governments for a single fixed term but not accountable to them. At least half the Institute's budget would involve research and development programs of corrective action. The recommendations of the Institute would be placed on the regular agenda of the United Nations for debate and discussion and would be accorded a sense of urgency comparable to that given to the military and political crises.

The author also proposes that a treaty be developed that codifies the international law of remedies for environmental injury. Such a code would then be available to help resolve environmental disputes.
[119 footnotes] FTP

9.19 (1.92) ENDRIN UPTAKE AND RELEASE BY FINGERLING CHANNEL CATFISH (ICTALURUS PUNCTATUS)

Argyle, Ray L., George C. Williams, and Harry K. Dupree (U.S. Bureau of Sport Fisheries and Wildlife, Southeastern Fish Cultural Laboratory, Marion Ala.)
Journal of the Fisheries Research Board of Canada 30, No. 11, 1743-1744 (Nov. 1973)

Fish ponds often receive runoff water containing pesticides from surrounding cultivated fields. An investigation was performed to determine the effects on catfish of chronic exposure to low levels of endrin. The fish were either fed purified diets containing endrin, or they were held in water containing endrin.

The results indicate that fish on diets containing 0.04, 0.4, and 4.0 µg endrin per gram of food rapidly accumulated the pesticide: 0.006, 0.037, and 0.31 µg per gram of fish tissue, respectively, after 20 days. No endrin was detected in the fish on a diet containing 0.004 and 0.0004 µg of endrin per gram of food. In addition, dietary endrin had no effect on growth or mortality of the fish. After the endrin-containing diet was replaced with a nonendrin-containing diet, the pesticide was eliminated and could not be detected after 41 days. In tissues of fish exposed to 0.5 µg endrin per liter of water, uptake of the pesticide occurred. Mortalities began at levels of 0.7 µg endrin per gram of wet whole fish, and 100% mortalities occurred at levels near 1.0 µg per gram of wet whole fish. No mortalities occurred in fish exposed to 0.25 µg endrin per liter of water.

The authors suggest that the low concentrations of endrin in the tissues of the fish is indicative of a rapid turnover rate for the pesticide. This suggestion is further supported by the rapid decrease in concentration in the tissues following withdrawal of the pesticide.
[3 references] SW

9.4 REVIEW OF THE FISHERIES RESEARCH BOARD OF CANADA 1971-1972

Anonymous
Department of the Environment, Fisheries Research Board of Canada, Ottawa, Canada (1973), 230 pp. Cat. No. Fs91-2/1972.

The report describes the research activities during 1971-1972 of the 10 laboratories, stations, and offices of the Fisheries Research Board of Canada. Members of the Board and of the staff are listed. Included is a list of publications and reports issued during the 2-year period. A version in French of this report is in preparation. FTP

9.3 THE PATRIMONIAL SEA

Nelson, L. D. M. (London School of Economics)
International and Comparative Law Quarterly 22, Part 4, 668-686 (Oct. 1973)

The patrimonial sea is defined as an economic zone not more than 200 miles in breadth from the base line of the territorial sea (not exceeding 12 miles in limit), where there will be freedom of navigation and overflight for ships and aircraft for all nations, but in that zone the coastal State will have an exclusive right to all resources. This concept in the law of the sea, the author states, apparently emerged as a result of the conflict of interests between certain coastal states and nations possessing distant-water fishing fleets. In this article the author discusses the genesis of the concept, some observations concerning the international legal issues raised mainly by Latin American maritime claims, the spread of the 200-mile maritime claim, rights and duties in the patrimonial sea, custodianship and the concept of the patrimonial sea, some criticisms of the concept of the patrimonial sea, and the concept of patrimonial sea and the regional approach to international maritime law.
[96 footnotes] FTP

9.6 ESTABLISHMENT OF AN ONGOING SEA GRANT PROGRAM IN MARINE PROBLEMS AS THEY RELATE TO INDUSTRIAL AND SOCIO-POLITICAL DEVELOPMENT OF THE GULF COAST REGION. PHASE III. INDEX OF PUBLICATIONS RELATIVE TO THE MISSISSIPPI GULF COAST

Anonymous
Sea Grant Publication No. MSGP-72-012, Bureau of Business Research, School of Business Administration, University of Southern Mississippi, Hattiesburg, MI 39401 (Dec. 1972), 100 pp.

The purpose of this inventory of publications was to identify, categorize, index, and generally bring together research information relative to marine problems related to industrial and socio-political development of the Mississippi Gulf Coast Region. The index is divided into three parts. Section I lists publications by subject matter. Section II lists publications alphabetically under sponsoring, contracting, or controlling agency, and these publications are cross-indexed to section I (the alphabetical list). Section III is the author index, and it, too, is cross referenced to publications in section I. FTP

9.7 THE COASTAL FISHERMEN OF LOUISIANA: THEIR CHARACTERISTICS, ATTITUDES, PRACTICES AND RESPONSIVENESS TO CHANGE

Pesson, L. L. (Louisiana State University)
Cooperative Extension Service, Center for Agricultural Sciences and Rural Development, Louisiana State University, Baton Rouge, La. (Nov. 1973), 60 pp.

The success of the transfer of research findings to practical application is important in the chain of development and progress. This study was carried out to identify precisely the audience for fisheries extension work. Such information would be useful in developing the methodologies and strategies for the fishery technology transfer process (extension service program). The desired information was obtained by interviewing a representative number of fishermen in 14 parishes (counties) of the coastal area of Louisiana.

In general, the typical fisherman from the coastal Louisiana area tended to be middle-aged, to have somewhat less education than the larger segment of society, and to live in a rural area. He is individualistic and self-reliant. He has little knowledge regarding the fisheries extension services. In regard to their pattern of change, their adoption behavior was normal. The author suggests that a broad scale comprehensive extension education program, involving extensive use of specialists, would seem to be in order.
[28 tables, 1 reference] FTP

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